



UNITED NATIONS
INDUSTRIAL DEVELOPMENT ORGANIZATION



MINISTRY OF PLANNING AND
INVESTMENT OF VIETNAM

ECO-INDUSTRIAL PARKS VIET NAM HANDBOOK ON PREVENTION, PREPAREDNESS AND RESPONSE TO ENVIRONMENTAL ACCIDENTS FROM INDUSTRIAL ZONES



INCLUSIVE AND SUSTAINABLE INDUSTRIAL DEVELOPMENT

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ACKNOWLEDGEMENTS

This handbook was prepared under the framework of the UNIDO project “Implementation of Eco-Industrial Park Initiative for Sustainable Industrial Zones in Vietnam” and was jointly implemented by the Ministry of Planning and Investment (MPI) of Viet Nam and UNIDO.

A number of agencies, organizations and individuals contributed to this report by providing materials, sharing comments and providing information on industrial activities in the industrial zones and their impact in the surrounding community, as well as on the situation regarding environmental management, environmental accidents occurring in the localities and the activities implemented in relation to prevention, preparedness and response to environmental accidents.

The handbook was drafted by Ms. Nguyen Trinh Huong and Ms. Nguyen Thi Thu with contributions from Mr. Alessandro Flammini (UNIDO). The authors would like to thank Mr. Tran Duy Dong (MPI); the Project Management Unit of the project; Mr. Jerome Stucki (UNIDO Project Manager); the Industrial Zone Management Boards in Ninh Binh Province, Da Nang and Can Tho cities; the enterprises in Khanh Phu and Gian Khau industrial zones (in Ninh Binh Province), Hoa Khanh Industrial Zone (in Da Nang City) and Tra Noc 1 and 2 industrial zones (in Can Tho City) for their contribution to the project, as well as local authorities and communities in these industrial zones.



**CENTRE FOR ENVIRONMENT AND
COMMUNITY DEVELOPMENT**

ACRONYMS AND ABBREVIATIONS

DARD	Department of Agricultural and Rural Development
DoC	Department of Construction
DoF	Department of Finance
DoH	Department of Health
DoIC	Department of Information and Communication
DoIT	Department of Industry and Trade
DoLISA	Department of Labour, Invalids and Social Affairs
DoNRE	Department of Natural Resources and Environment
DoST	Department of Science and Technology
DoT	Department of Transport
FPF	Fire Prevention and Fighting
IZ	Industrial Zone
MBIZ	Management Board of Industrial Zone
NGO	Non-governmental Organization
OECD	Organisation for Economic Co-operation and Development
OSH	Occupational Safety and Health
PMC	Provincial Military Command
PPC	Provincial People's Committee
UNEP	United Nations Environment Programme (now UN Environment)

PART 1

INTRODUCTION

1.1. BACKGROUND

A number of serious environmental accidents have been caused by industrial activities in Viet Nam in recent years, including technical/technological accidents, human-induced accidents or natural disasters. These accidents have caused damage to people, property and the ecological environment, the latter being more difficult to measure. In addition, pollution of air and water (including surface water and groundwater) have tended to increase as a result of industrial activities in general, in particular those in industrial zones (IZs), affecting the health, life and economic development of the community. A number of serious environmental accidents have occurred in recent times, These include the oil scum spill of a tank in a gas station in Thanh Hoa City (17 December 2019), the breakdown of a gypsum dumping dam of the DAP Fertilizer Plant no. 2 in Tang Loong IZ, Lao Cai Province (7 September 2018), the pollution of the sea in four central provinces as a result of the operation of Hung Nghiep Formosa Ha Tinh Iron and Steel Co. Ltd in Vung Ang Economic Zone (from April 2016), the breaking of shores of the titanium mining waste reservoir of Tan Quang Cuong Co. Ltd., Binh Thuan Province (16 June 2016) and the breaking of the sludge storage tank of the lead and zinc factory of CKC Co. Ltd, Cao Bang Province (5 January 2016).

The characteristics of IZs, where many enterprises are concentrated in one place, mean that when an accident occurs (for instance a fire or chemical spill), it is easy for it to spread from one enterprise to its neighbour. For the many IZs that tend to specialize in highhazard areas such as production or trade of petroleum, gas and chemicals, this risk can be even greater. In addition, the wastewater treatment stations of IZs are generally large in scale. As a result, in the event of an accident, the damage level and potential scope of the impact upon the community and the environment can be significantly greater than that of an independent enterprise located outside IZs.

Although there are a number of legal regulations in place relating to the prevention of and response to environmental and natural disasters, their implementation and practical application continues to face a number of challenges.

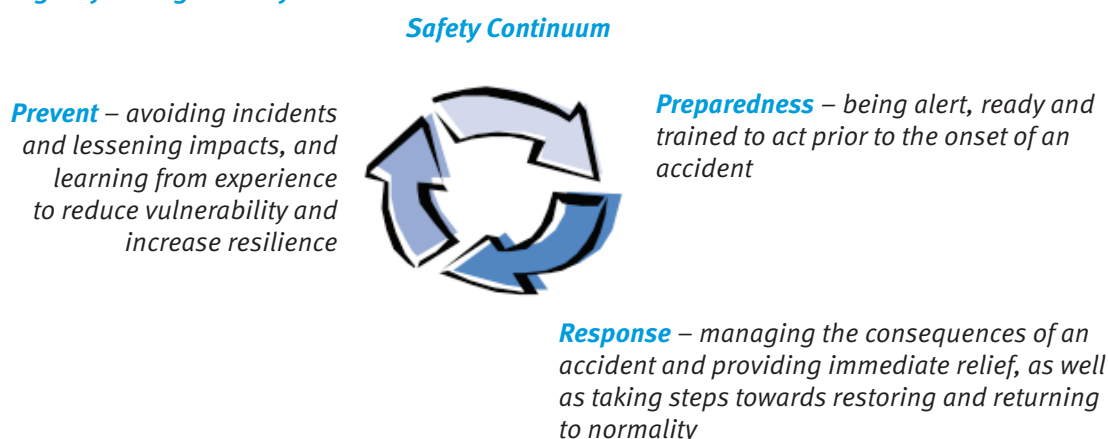
1.2. SCOPE OF THE HANDBOOK

This handbook seeks to address the wide range of issues that need to be dealt with in order to ensure the safe and effective operation of IZs, i.e. the actions that should be taken by different stakeholders in order to achieve the following:

- Minimize the likelihood that an accident will occur (prevention).
- Mitigate the consequences of accidents through emergency planning and risk communication (preparedness).
- Limit the adverse consequences to health, environment and property when environmental accidents occur (response).
- The handbook also includes necessary actions after environmental accidents (follow-up) in order to reduce future accidents.

All of the above activities could be described as a “Safety Continuum” or “Emergency Management Cycle”¹

Figure 1: Emergency management cycle



This handbook has been prepared for the following main target groups:

- Management Boards of Industrial Zones (MBIZ) of provinces and cities.
- Owners of building and trading IZ infrastructure.
- Local authorities in IZ areas.
- Enterprises operating in IZs.
- Representative organizations of the community.
- Residential communities living around IZs.

Beside the stakeholders listed above, officials involved in land and environmental management may also refer to this document.

¹ OECD (2003). *Guiding Principles for Chemical Accident Prevention, Preparedness and Response*. Available online at <http://www.oecd.org/env/ehs/chemical-accidents/Guiding-principles-chemical-accident.pdf>

1.3. DEFINITIONS

Industrial Zone is an area with defined geographical boundaries, specialized in manufacturing industrial goods and providing services for industrial production, established under the conditions, order and procedures stipulated in Decree 82/2018/ND-CP².

Hazard is a dangerous phenomenon, substance, human activity or condition that may cause loss of life, injury or other health impacts, property damage, loss of livelihoods and services, social and economic disruption or environmental damage.

Technological hazard is a hazard originating from technological or industrial conditions, including accidents, dangerous procedures, infrastructure failures or specific human activities, that may cause loss of life, injury, illness or other health impacts, property damage, loss of livelihoods and services, social and economic disruption or environmental damage. Technological hazards may also arise directly as a result of the impacts of a natural hazard event.

Natural hazard is a natural process or phenomenon that may cause loss of life, injury or other health impacts, property damage, loss of livelihoods and services, social and economic disruption or environmental damage³.

Risk is the chance of harmful effects upon human health or ecological systems.

Risk assessment is the process that characterizes the nature and magnitude of health risks to humans and ecological receptors from chemical contaminants and other stressors that may be present in the environment⁴.

Environmental pollution means any change in environmental elements that does not conform to environmental standards and has an adverse effect on humans and living creatures.

Environmental accident means any catastrophic event or risk that occurs in the course of human activities, or any sudden natural occurrence that causes serious environmental pollution, degradation or change⁵.

Disaster is a serious disruption of the functioning of a community or a society involving widespread human, material, economic or environmental losses and impacts, which exceeds the ability of the affected community or society to cope using its own resources⁶.

Natural disaster is a major adverse event resulting from natural processes of the Earth. Examples include floods, hurricanes, tornadoes, volcanic eruptions, earthquakes, tsunamis and other geological processes. A natural disaster can cause loss of life or damage to property, and typically leaves economic damage in its wake, the severity of which depends on the affected population's resilience or ability to recover, as well as on the infrastructure available⁷.

Prevention is the outright avoidance of adverse impacts of hazards and related disasters.

Preparedness is a continuous cycle of planning, training, exercising and evaluating, focused on achieving improvement in the efforts of all community stakeholders to understand the risks and hazards of accidents in their community and to assume their responsibilities in preventing accidents and responding to those that occur.

Emergency is an event that will produce or exacerbate injury to people and/or damage to property unless immediate intervention occurs. This is a threatening condition that requires urgent action⁸.

Emergency response includes any systematic response to an unexpected or dangerous occurrence. The goal of an emergency response procedure is to mitigate the impact of the event upon people and the environment⁹.

2 Vietnam Government (2018). *Decree 82/2018/ND-CP dated 22 May 2018 on the management of industrial parks and economic zones*. Available online at https://eipvn.org/wp-content/uploads/2018/09/N%C4%90-82_2018_ND-CP_English-version.pdf

3 UNEP (2015). *Awareness and Preparedness for Emergencies at Local Level*. Available online at http://apell.eecentre.org/Modules/GroupDetails/UploadFile/APELL_Handbook_2016_-_Publication.pdf

4 US-EPA (2019). *Risk assessment*. Available online at <https://www.epa.gov/risk>

5 Vietnam National Assembly (2014). *Law on Environmental Protection*. Available online at <http://extwprlegs1.fao.org/docs/pdf/vie168513.pdf>

6 UNEP (2015). *Awareness and Preparedness for Emergencies at Local Level*. Available online at http://apell.eecentre.org/Modules/GroupDetails/UploadFile/APELL_Handbook_2016_-_Publication.pdf

7 NOAA National Centers for Environmental Information (2019). U.S. Billion-Dollar Weather and Climate Disasters and G. Bankoff, G. Frerks, D. Hilhorst (eds.) (2003). *Mapping Vulnerability: Disasters, Development and People*. ISBN 1-85383-964-7. Definition available online at https://en.wikipedia.org/wiki/Natural_disaster

8 UNEP (2015). *Awareness and Preparedness for Emergencies at Local Level*. Available online at http://apell.eecentre.org/Modules/GroupDetails/UploadFile/APELL_Handbook_2016_-_Publication.pdf

9 Safeopedia. *Safety Terms tagged with ,Best Practices'*. Available online at <https://www.safeopedia.com/definition/195/emergency-response>

1.4. HANDBOOK STRUCTURE

This handbook is divided into four main parts, as follows:

- Part 1: Introduction.
- Part 2: Identification and assessment of potential risks causing environmental accidents from IZs. This part introduces some of the common hazards that could cause environmental accidents from IZs. It also introduces risk assessment methodology, to which users can refer in order to assess potential specific risks.
- Part 3: Guidelines for prevention, preparedness and response to environmental accidents for six main stakeholder groups. This part introduces the responsibilities and necessary activities for each stakeholder group before, during and after accidents, based on actual regulations, international and domestic experiences.
- Part 4: Development of an organizational system for different authorities within a province in terms of environmental accident prevention, preparedness and response. This part introduces a general organizational chart of the parties, the responsibilities and actions of each party, as well as the coordination between parties in the event of environmental accidents.

In addition, the handbook includes seven appendices.

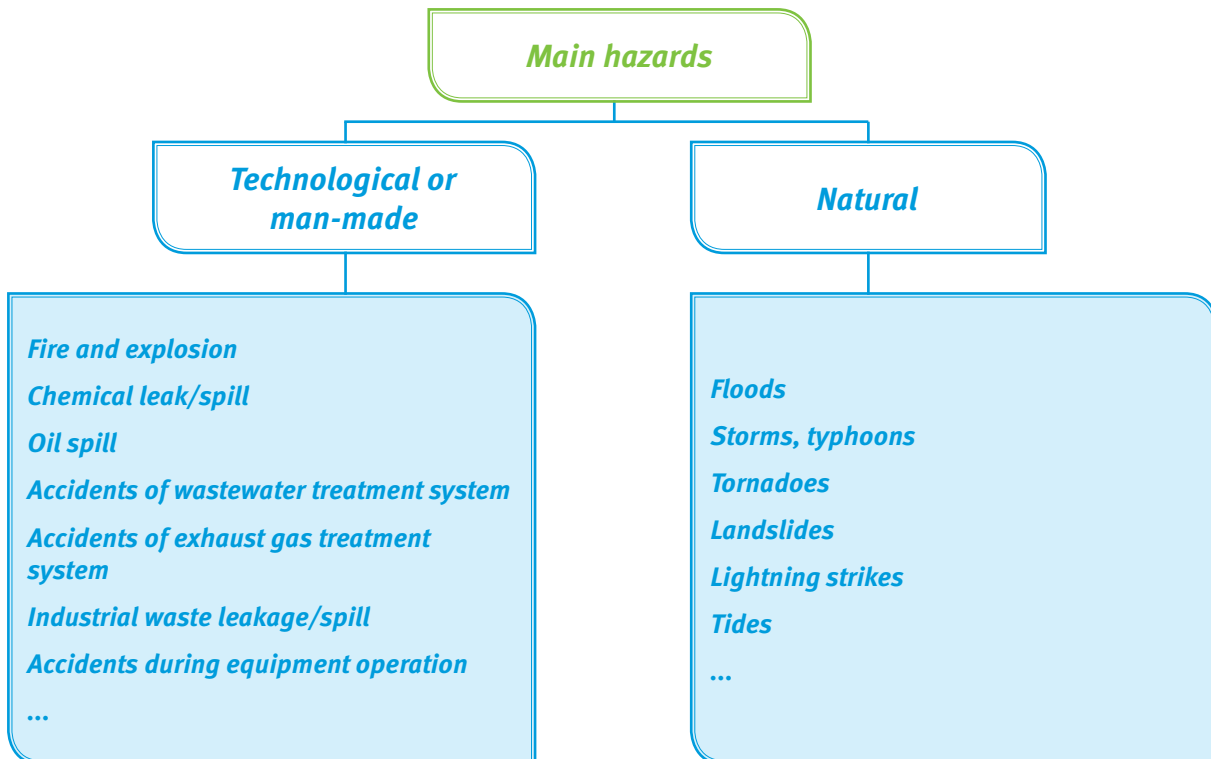
PART 2

IDENTIFICATION AND ASSESSMENT OF POTENTIAL RISKS CAUSING ENVIRONMENTAL ACCIDENTS FROM IZs

2.1. HAZARD IDENTIFICATION

Although a great number of different hazards can cause environmental accidents, this handbook will introduce only the major hazards that are more likely to occur. These hazards can be technological, human or natural (see Figure 2 below).

Figure 2: Major hazards causing environmental accidents



2.1.1. Technological and man-made hazards

Fire and explosion

The main causes of fire and explosion from industrial activities and services in the IZs may include the following:

- Fire due to electricity system failure. This may stem from causes such as overloading, short-circuiting, bad wiring (loose or open), electrostatic, an electric arc, heat transfer of electricity-consuming objects or lightning discharge.
- Fire by splashing welding sparks.
- Fire due to the reaction of chemicals.
- Fire and explosion of high-temperature equipment such as incinerators, furnaces, flammable gas pipelines and material tanks when exposed to fire or electric sparks.
- Fire and explosion at stations or companies dealing in petrol and gas where there is a presence of fire-causing agents.
- Explosion caused by a sudden change of pressure, for instance when pouring cold water into molten metal.
- Explosion of pressure devices as a result of the increased internal pressure, whereby the container does not withstand the compression pressure and therefore explodes.

In addition, employees who have not been trained in fire prevention or whose training is inadequate could themselves be indirect causes of fire and explosion within enterprises.

Chemical leakage/spills

Some of the common causes of chemical leakage/spills are outlined below¹⁰:

Leakage problems during storage

- People who are in charge of warehouse management are not fully equipped with information about all of the chemicals in stock or are not knowledgeable about their characteristics and dangerous properties.
- The design and building of warehouses are not in accordance with chemical safety standards for warehouses.
- Chemicals stored in warehouses are not arranged according to regulations.
- Chemical storage tanks and containers are not safe use, with corrosion and rust leading to openings and holes.

Chemical leakage during transport

- Transport personnel are unaware of the physical and chemical properties of chemicals and safety measures, or of accident-handling.

¹⁰ Van Can, Xuan Hai. *Learn about leaks and spills during storage and use of Hydrochloric Acid*. Available online at <http://daihocpccc.edu.vn/ArticlesDetail/tabid/193/cateid/65/id/9697/language/vi-VN/Default.aspx>

- Containers do not guarantee tightness due to the opening of closed valves, linked valves and punctured pipes.
- Means of transport have parts that damage containers, such as sharp edges or exposed nails, etc.
- During transportation, collisions occur of static and hydraulic cylinders etc., or as a result of the arrangement or stacking of equipment.
- A lack of care in transportation causes the displacement of containers, thereby resulting in chemicals spilling out.
- Traffic accidents.

Chemical leakage during use

- Users are not trained and there is a lack of knowledge about dangerous properties and their use with other chemicals creating a mixture of flammable chemicals, corrosive chemicals, toxic chemicals, etc.
- Users do not follow safety measures when using hazardous chemicals.

Oil spills

Oil spill is the phenomenon by which oil from different storage and transport means – from buildings and oil fields – escapes into the natural environment as a result of technical problems, natural disasters or human causes. Oil spills often occur in the activities of search, exploration, exploitation, transport, processing, distribution and storage of oil and oil products. The usual direct causes are leaks or broken pipes on oil tanks, collisions or accidents that cause shippiercing, shipwrecks or accidents at oil rigs, petrochemical refineries, petrol stations, etc. Oil spills can also occur as a result of natural leaks from oil-bearing geological structures on the seabed due to the activities of the earth’s crust, such as earthquakes.

In the IZs, oil spills can occur in areas of storage tanks, petroleum import and export, areas of production and repair using oil, technological piping systems, gasoline transport vehicles, car washing and cleaning areas for machinery and equipment, etc.

Accidents of the wastewater treatment system

Potential major problems with the wastewater treatment system may include the following:

- The amount of wastewater generated exceeds the capacity of the wastewater treatment plant or the broken pumps, causing the overflow of wastewater collection tanks.
- Breaking sewage pipelines or valves.
- Cracking or breaking of the treatment system’s tanks.
- The treatment efficiency is not achieved, or the quality of the output water does not meet the required standards due to fluctuating input water quality, broken equipment or problems in treatment tanks.
- Spillage of chemicals in chemical stores or chemical mixing houses.
- Fire or explosion in the control system or electrical cabinet as a result of electric shock or lightning strike.

Accidents of the exhaust gas treatment system

Potential major problems with the exhaust gas treatment system may include the following:

- Electrical problems, leading the treatment system to stop working or to work in an unsatisfactory manner.
- Torn filter bag or broken suction fan and air compressor due to a lack of regular maintenance.
- Damaged water/solution supply pumps or circulation pumps for the scrubbers.
- Explosion or other accidents of electrostatic filters as a result of technical errors, operator qualifications or a lack of regular maintenance.
- Pipeline system for exhaust gas not tight enough.
- Operator intentionally fails to run the treatment system.

Industrial waste leakage/spills

Some of the common causes of industrial waste leakage/spills are as follows:

- Accidents during transportation of waste.
- Cracking and breaking of waste tanks/lakes.
- Technical accidents at waste treatment works.
- Overflow due to overload, heavy rain, floods, flash floods or landslides.
- Failure to pump or cracking/breaking pipes of the leachate system.
- Operators of the waste treatment system do not comply with the regulations of safe operation or are not fully trained.

W

There are different types of accidents for each type of equipment. The main reason for accidents, however, is that employers have failed to comply with regulations on inspection, equipment inspection, training and education for employees, use of appropriate raw materials, fuel and chemicals, environmental monitoring, etc., while employees have not complied with safety regulations in equipment operation or have not failed to attend all of the required training sessions.

In addition, natural disasters can cause problems for equipment during operation. In this case, the accidents are often very serious.

2.1.2. Natural hazards causing environmental accidents

Natural hazards or disasters may include earthquakes, tsunamis, floods, landslides, storms, tornadoes or tides, among others, however this handbook will consider only natural hazards that may cause environmental accidents in IZs and affect communities living around IZs. These include the following :

- Storms/floods can cause the overflow of chemical tanks, wastewater treatment tanks, drainage channels, rolling materials or waste flowing into residential areas. Storms/floods can damage electrical systems, resulting in fire, electric shock, etc.

- Tornadoes can cause the collapse of buildings and electrical systems, which in turn can lead to fire and explosion. Tornadoes can roll material, debris and waste into residential areas.
- Floods and landslides in IZs or waste storage and treatment facilities can cause the collapse of buildings, fires or rolling of material or wastes flowing into residential areas.
- Tide causes flooding in IZs, rolling materials or waste into residential areas or shortcircuit, causing electric shock or fire.
- Lightning strikes on buildings can cause fire and damage to the electrical system.

2.2. ENVIRONMENTAL RISK ASSESSMENT

Risk assessment is a process that includes a number of steps: identifying hazards, assessing scenarios, evaluating consequences, assessing likelihoods and integrating and comparing risks. The steps involved in the environmental risk assessment process and an illustrative example can be found in Appendix 1. Managers at different levels should conduct hazard identification and risk assessment for all potentially dangerous equipment, materials, manufacturing stages, works, etc. The content of the environmental risk assessment process includes the steps outlined below.

Hazard identification

All hazards that are likely to cause environmental accidents need to be identified. Users can refer to the types of hazards in Section 2.1 and conduct risk assessments for the potential hazards in which they are interested.

Accident scenario assessment

For each risk, it is necessary to identify the possible causes. For instance, if a wastewater treatment tank has overflowed, the reasons might be overcapacity, a broken water pump, flooding, etc. This step should consider the possibility of human error and technology, as well as the possibility of natural disasters and/or intentional acts (such as vandalism, terrorism or theft) that cause environmental accidents or disasters.

Consequence assessment

The assessment of risks that may cause environmental accidents should take into account all possible consequences, including those for the environment, health, assets, crops, social and spiritual factors, etc. In general, the assessment of the environmental consequences of accidents, in order to identify measures to prevent and mitigate them, is complicated by the lack of data and tools. The assessment of health consequences for humans is also difficult due to the need for a long period of time to handle the assumed problems.

Likelihood assessment

This is a component of risk assessment, estimating the likelihood of a risk (frequency). In the Safety Risk Assessment, the likelihood of a risk is determined by a review of statistics related to that type

of device or the use of forecasting methods. In Environmental Risk Assessment and Ecosystem Risk Assessment, meanwhile, the likelihood of identified hazards is determined by assessing the possibility of exposure through identification of transmission pathways and exposed subjects.

Risk assessment

Risk assessment can be carried out qualitatively and/or quantitatively. Quantitative assessment, however, is quite complicated and is usually performed through research based on modelling methods. Qualitative or semi-quantitative assessment is widely used, based on risk estimation, which in turn is based on the severity of the consequences and the likelihood of risk occurrence, as per the following formula:

- Risk (R) = Consequence (C) x Likelihood (L)

It is possible to use the matrix method combining qualitative or semi-quantitative ranking scores for risk assessment. Depending on the purpose of the assessment, the way of attributing points for C and L differs from the way of evaluating R. Users can refer to matrix tables for a number of assessment purposes in Appendix 2, namely the Occupational safety and health (OSH) risk assessment matrix in enterprises (Appendix 2.1), the environmental risk assessment matrix (Appendix 2.2) and risk assessment of lake or river water quality (Appendix 2.3).

Risk assessment should be a continuous process. Assessments should be reviewed and reevaluated periodically. When there are changes in technology, infrastructure, materials, natural factors, etc., assessments need to be revised. The stakeholders affected, including representatives of the community, should play a role in the risk assessment process, especially for assessing the severity of consequences. Decisions affected by risk assessments may be important, in particular for employees, the community and emergency responders likely to be affected in the event of an accident.

PART 3

PREVENTION, PREPAREDNESS AND RESPONSE TO ENVIRONMENTAL ACCIDENTS FROM IZs

3.1. GENERAL PRINCIPLES¹¹

- Environmental accident prevention is the concern of all stakeholders in the IZs, including enterprises, IZ owners, MBIZ, local authorities, interdisciplinary management agencies at all levels and communities.
- Enterprises, IZ owners, MBIZ and local authorities should make emergency prevention, preparedness and response plans for accidents related to the identified risks. The plans include detailed technical procedures and detail the appropriate organization to minimize the impact upon health, the environment and property in the event of an accident. Emergency response plans need to identify the roles and responsibilities of all parties involved (including public service units) and must indicate the chain of command, the communication line, the coordination between parties and the means of obtaining the necessary information, resources and equipment.
- All responsible parties need to ensure human resources, equipment, finance and other necessary resources to implement prevention and emergency response plans.
- In the event of an accident, information on the situation must be promptly announced and the relevant local authorities notified in a timely manner.
- Stakeholders need to be proactive and ready to deal with human resources, facilities and equipment for the appropriate response activities. They must also take all reasonable measures to minimize human and property damage and to the limit adverse effects upon human health and the environment.
- The safety of the people and means participating in the accident response should be ensured.
- The designated spokesperson should have the knowledge, skills, authority and credibility necessary to communicate with the media, ensuring that the information is provided to the public in a formal and effective way.
- The parties responsible for emergency response should participate in the planning process. After the accident, environmental accident prevention, preparedness and response plans should be reviewed and revised based on the lessons learned.

¹¹ This section is based on the evidence collected in following report, among others: "UNIDO, 2019. *Eco-industrial parks Viet Nam: Prevention, preparedness and response to environmental accidents for communities, workers, and municipalities*. Experiences and practices from other countries. Available online at <https://www.unido.org/sites/default/files/files/2019-05/Vietnam-Prevention-preparedness-and-response-to-environmental-accidents-1.pdf> "

3.2. GUIDANCE FOR MANAGEMENT BOARDS OF INDUSTRIAL ZONES

3.2.1. Roles and responsibilities

In the prevention of, preparedness for and response to environmental accidents, the MBIZ have the following roles and responsibilities:

- Cooperate with police units and other competent authorities in inspecting maintenance of public security and order, fire and explosion prevention and control.
- Formulate and propose measures to maintain public security and order, and organize security forces and Fire prevention and fighting (FPF) forces in IZs¹².
- Draft a coordination regulation for environmental protection of the IZs between the MBIZ and the Provincial Department of Natural Resources and Environment (DoNRE) and the People's Committee of the district, provincial city or town, and submit it to the Provincial People's Committee (PPC) for approval.
- Guide and inspect the IZ owners and establishments operating in the IZs in implementing environmental protection regulations.
- Detect and promptly report violations of the environmental protection law to competent state management authorities for settlement and handling.
- Mobilize forces to respond to and remedy environmental accidents occurring in the IZs¹³.

3.2.2. Necessary activities

3.2.2.1. Prevention and preparedness

IZ planning

Making and implementing plans of IZs and surrounding areas is highly significant in terms of preventing and mitigating the adverse impacts of industrial activities (e.g. discharging toxic substances, fire and other accidents) through compliance with regulations on the safe distances between enterprises and residential areas¹⁴. Specifically, these are as follows:

- Type of hazardous enterprise level I: minimum distance of 1 000 m.
- Type of hazardous enterprise level II: minimum distance of 500 m.

¹² Vietnam Government (2018). *Decree 82/2018/NĐ-CP dated 22 May 2018. Management of industrial parks and economic zones*. Article 63. Available online at https://eipvn.org/wp-content/uploads/2018/09/N%C4%90-82_2018_NĐ-CP_English-version.pdf

¹³ Ministry of Natural Resource and Environment (2015). *Circular No. 35/2015/TT-BTNMT dated June 30, 2015. Providing for the environmental protection of economic zones, industrial parks, export processing zones and hi-tech parks*. Article 14. Available online at <http://extwprlegs1.fao.org/docs/pdf/vie168540.pdf>

¹⁴ Vietnam Government (2017). *Decree No. 113/2017/NĐ-CP detailing and guiding the implementation of a number of articles of the Chemical Law*. Article 22.

- Type of hazardous enterprise level III: minimum distance of 300 m.
- Type of hazardous enterprises level IV: minimum distance of 100 m.
- Type of hazardous enterprise level V: minimum distance of 50 m¹⁵.

MBIZ are responsible for implementing legal requirements on environmental

Box 1: Environmental protection requirements in IZ construction planning¹⁵

1. A plan on functional quarters within an IZ must ensure minimum impacts of polluting production activities on other production activities and facilitate the prevention of and response to environmental accidents.
2. Projects in an IZ must ensure an environmental safety distance in line with national technical regulations on infrastructure facilities to mitigate possible impacts upon other establishments in the IZ and surrounding socio-economic subjects.
3. Technical infrastructure for environmental protection shall be arranged in a way suitable to different forms of investment in an IZ, ensuring minimum negative impacts upon the surrounding environment.
4. Greenery coverage in an IZ must account for at least 10 percent of the IZ's total area.

protection in the construction planning of IZs.

Planning for prevention of and response to environmental accidents

MBIZ, local authorities (at all levels) and IZ owners should coordinate activities to make plans for the prevention of and response to environmental accidents from IZs. The purpose of these activities is to establish on-site agreements and assignments to limit or eliminate in-place hazards that affect the environment, health and property.

Based on the plans for prevention of and response to environmental accidents built by IZ owners for each IZ, the MBIZ should build a plan for the prevention of and response to environmental accidents for IZs in the province, with the following main contents:

- Identify hazards that may cause environmental accidents from IZs and neighbouring industrial activities.
- Assess the risks of such hazards, especially those that may spread to nearby residential areas.
- Develop a programme of capacity-building for MBIZ staff, training and dissemination of information and documents for IZ owners and enterprises.
- Develop mock drill programmes with different scenarios and adjust the plan following the drills.

¹⁵ Ministry of Construction (2008). *Promulgating the Vietnam Building Code on Regional and Urban Planning and Rural Residential Planning QCXDVN 01: 2008/BXD* regulates the location of industrial establishments compared to residential areas must comply with the standard TCVN/4449/1987 "Urban construction planning - Design standards". Article 2.7. Available online at https://binhdinh.eregulations.org/media/04_2008_QD-BXD_85111.pdf

¹⁶ Ministry of Natural Resource and Environment (2015). *Circular No. 35/2015/TT-BTNMT dated June 30, 2015. Providing for the environmental protection of economic zones, industrial parks, export processing zones and hi-tech parks*. Article 7. Available online at <http://extwprlegs1.fao.org/docs/pdf/vie168540.pdf>

- Develop an emergency response procedure, including the establishment of a steering committee and assignment of specific responsibilities, communication options, response plans (plan for relocation and protection of assets of enterprises, plan for evacuation of workers, customers and suppliers), equipment, supplies, transport means, health care support and necessary logistics.
- Follow-up activities (damage assessment, support plans, etc.).
- Arrangement of resources (human, financial, equipment) for the plan.

Education, training and communication

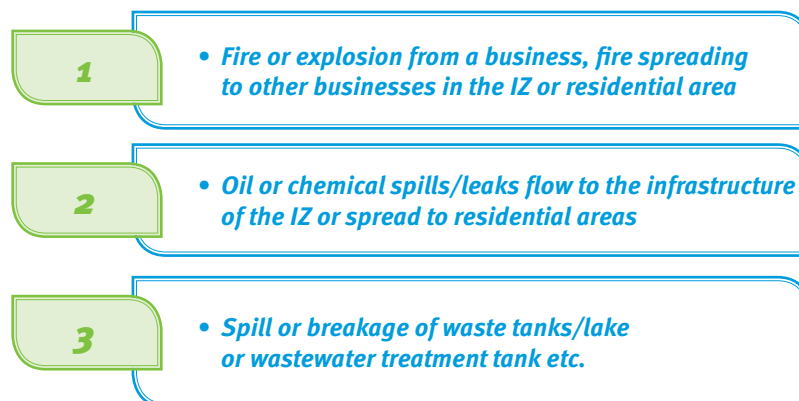
MBIZ could use planned budgets and take advantage of support from different projects, Nongovernmental organizations (NGOs) and universities to organize the following:

- Capacity-building for MBIZ staff on disaster management, monitoring and evaluation of enterprises in compliance with legal regulations on environmental protection, environmental accident prevention, response and rescue, etc.
- Training for enterprises on laws and related legal documents, policies of IZs, guidance for enterprises to develop environmental accident prevention and response plans, resource mobilization procedures, etc.
- Communication for the community, in particular for people living around the IZs at the time of potential accidents from IZs, as well as impacts, ways to prevent and mitigate damage, response activities (including how to notify when accidents occur) and cleanup after accidents, etc.

Mock drills

Rehearsal of emergency situations is a part of the preparedness phase. With its position, the MBIZ could organize environmental accident prevention and response mock drills at different levels (industrial clusters, IZs or businesses and neighbouring communities).

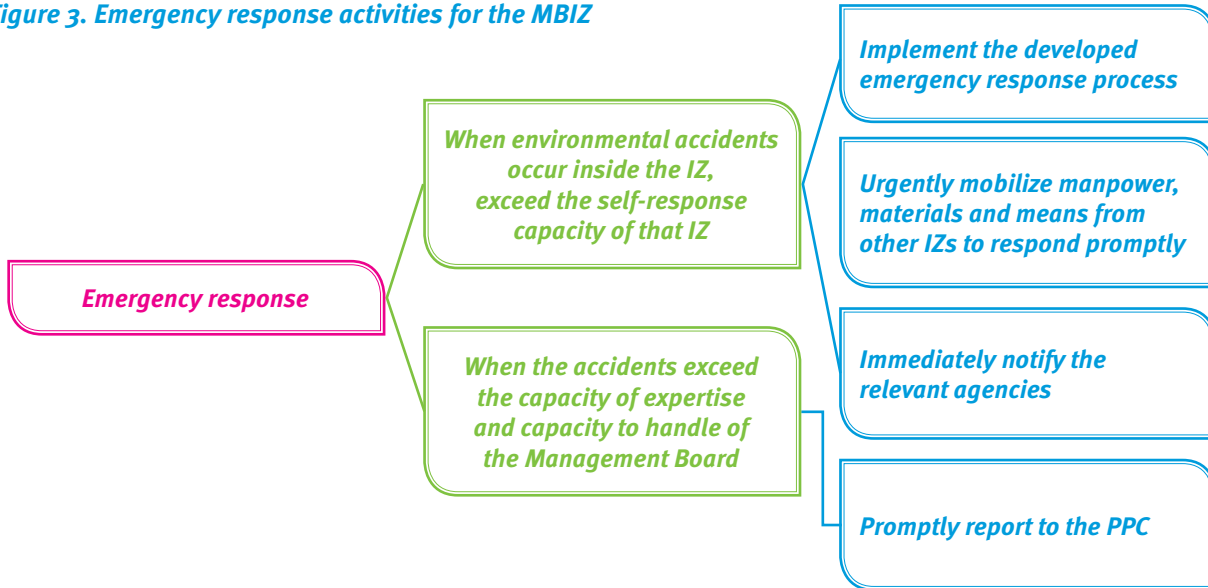
MBIZ could organize emergency response mock drills for the following scenarios:



3.2.2.2. Emergency response

Activities in response to environmental accidents of the MBIZ are shown in Figure 3 below.

Figure 3. Emergency response activities for the MBIZ



3.2.2.3. Follow-up to accidents

MBIZ should preside or coordinate with related parties to carry out activities after environmental accidents, as follows:

- Support for the assessment of losses after environmental accidents and appropriate compensation and insurance mechanisms.
- Promulgate preferential policies and incentives for insurance, business trading and environmental accident risk insurance.
- Participate in overcoming the consequences of environmental accidents and preparing reports to prevent their recurrence.
- Call for support for enterprises to restore production and mobilize the sharing among enterprises in the IZ.
- If a number of enterprises in the IZ should cause environmental accidents without agreeing on responsibility, the MBIZ are responsible for coordinating with the IZ owners and related enterprises to clarify responsibilities in terms of compensation, pollution remediation and environmental rehabilitation.
- MBIZ are a bridge between the surrounding community, state management authorities and enterprises in the process of overcoming consequences, compensation and litigation on issues related to environmental accidents.

3.3. GUIDANCE FOR OWNERS OF BUILDING AND TRADING IZ INFRASTRUCTURE

3.3.1. Roles and responsibilities

The owners of building and trading IZ infrastructure (hereafter referred to as IZ owners) have a responsibility to perform the following:

- Comply with regulations on public security, order, ensuring OSH, corporate culture, environmental protection, fire and explosion prevention and control.
- Cooperate with police forces and the competent authorities in formulating plans for fire and explosion prevention and control, ensuring public security, order and social safety within local jurisdictions in which investors are operating.
- Build and operate concentrated wastewater treatment stations and other environmental protection works (if any) in accordance with legislation on environmental protection¹⁷.

3.3.2. Necessary activities

3.3.2.1. Prevention and preparedness

IZ planning

The IZ owner is responsible for the detailed planning of the IZ, submission to the MBIZ and the PPC of the IZ's location and submission to the Ministry of Construction for approval.

Detailed planning of IZs must be ensured¹⁸, as follows:

- Complying with legal regulations on environmental protection. The location of industrial plants must minimize the adverse impacts upon the living environment of residential areas on the principle that industrial plants that discharge toxic substances and cause the environmental pollution risks must be located at the end of the prevalent wind direction and at the end of rivers and streams, in relation to residential areas. It must also comply with regulations on the minimum safety distances according to current standards. Within a safe distance, at least 50 percent of the land area must be planted with trees, while no more than 40 percent of the land area may be used for parking lots, pumping stations, wastewater treatment stations and transfer stations for solid waste.
- Reasonable use of land and production organization are convenient and reasonable, with a rational layout of technical infrastructure and green trees and FPF requirements ensured.

¹⁷ Vietnam Government (2018). *Decree No. 82/2018/ND-CP dated May 22, 2018. Management of industrial parks and economic zones.* Article 31. Available online at https://eipvn.org/wp-content/uploads/2018/09/N%C4%90-82_2018_ND-CP_English-version.pdf

¹⁸ Ministry of Construction (2008). *Promulgating the Vietnam Building Code on Regional and Urban Planning and Rural Residential Planning QCXDVN 01: 2008/BXD* regulates the location of industrial establishments compared to residential areas. Article 2.7. Available online at https://binhdinh.eregulations.org/media/04_2008_QD-BXD_85111.pdf

- The industrial scrap yard must be fenced and must not adversely affect the sanitation conditions of surrounding enterprises, nor pollute the environment. The dangerous scrap yard (where fire and explosion, epidemics, etc. are easily caused) must take measures to handle toxic substances and ensure that isolation distances are respected.

Planning for prevention of and response to environmental accidents

IZ owners are responsible for developing and implementing plans to prevent, respond to and remedy environmental accidents and the natural disasters causing environmental accidents in the IZs, as prescribed.

Box 2: Main content of prevention of and response to environmental accident plan¹⁸

1. Identification and assessment of dangers of environmental accidents that may occur during the operation of the IZ, as well as circumstances for each type of danger of environmental accidents that is likely to occur.
2. Preventive measures for each environmental accident and measures to eliminate their causes.
3. A plan on the arrangement for on-the-spot forces to be ready to respond to and remedy each specific environmental accident circumstance. Plan on training and drilling in the prevention, response to and remediation of environmental accidents.
4. Installation and inspection of the necessary equipment, tools and facilities for responding to environmental accidents.
5. Implementation mechanism, notification and alert methods and mobilization of manpower and equipment and facilities, both in and outside the IZ, to cope with environmental accidents of different levels. Mechanism for coordination among related organizations and individuals in the area in responding to environmental accidents.
6. Solutions to addressing environmental pollution in the event of environmental accident occurrence.
7. A plan to mobilize financial resources for the implementation of the plan on prevention, response to and remediation of environmental accidents.

Training, communication and mock drill

- Train enterprises on the relevant legal regulations, policies of the IZ, development of environmental accident prevention and response plans, etc.
- Communicate to the community about potential accidents from IZ, their impacts, ways to prevent and reduce damage, emergency response and clean-up activities after accidents, etc.
- Organize mock drills to respond to environmental accidents (including firefighting drills) for both the IZ owner and IZ infrastructure. The IZ owner can coordinate with the MBIZ to organize drills on the scale of the entire IZ or with each enterprise within the IZ.

¹⁹ Ministry of Natural Resource and Environment (2015). *Circular No. 35/2015/TT-BTNMT dated June 30, 2015 providing for the environmental protection of economic zones, industrial parks, export processing zones and hi-tech parks*. Article 12. Available online at <http://extwprlegs1.fao.org/docs/pdf/vie168540.pdf>

In addition, the IZ owner operates like an enterprise and needs to take measures to prevent for their own service works, such as a wastewater treatment station, storage areas of solid waste and hazardous waste (if any), electricity and water supply systems, etc.

3.3.2.2. Emergency response

In the event of an accident occurrence in one (or more) enterprises in the IZ, the IZ owner needs to perform the following tasks:

- Receive information on accidents from enterprises.
- Preliminary determination of the type of accident, its extent and scope of influence.
- Urgently notify the relevant agencies (Environmental Protection, FPF, local authorities, etc.).
- Coordinate emergency response units from outside the IZ.
- Coordinate with enterprises to implement the emergency response.

In the event of an accident occurrence at the IZ owner's works (e.g. wastewater treatment station), the IZ owner needs to perform the following tasks:

- Determine the location of the accident, the type of accident, its extent and scope of influence.
- Localize the accident and limit its scope of influence of to the area around the IZ.
- Urgently notify the relevant agencies (Environmental Protection, FPF, local authorities, etc.).
- If there are accidents causing waste spillage as a result of overload, a broken pipe system or valve, cracked or broken tanks, etc., immediately stop the pumping system and implement the response solutions developed for each type of accident.
- If the wastewater treatment station encounters accidents related to the quality of treated wastewater (e.g. an increase in bad odour, dense foam, scum, grease, excessive sludge, etc.), it will be necessary to apply carefully the appropriate treatment techniques.

3.3.2.3. Follow-up to accidents

The IZ owners should preside or coordinate with related parties to carry out follow-up activities as follows:

- Coordinate with the MBIZ, local authorities and relevant state management authorities (environment, labour, police, etc.) and enterprises to conduct surveys and inspections in order to determine the causes of environmental accidents, their scope of influence, the degree of damage, etc.
- Coordinate with enterprises and the community to quickly implement measures to overcome the consequences of environmental accidents, restore production and business, clean up and restore the environment.
- Prepare reports for the MBIZ, local authorities and other relevant authorities.
- Improve planning, coordination, response and recovery, etc., in an attempt to prevent the recurrence of accidents.

3.4. GUIDANCE FOR LOCAL AUTHORITY

3.4.1. Roles and responsibilities

Local authorities at all levels within the scope of their duties and powers should carry out the following:

- Preside over and organize the implementation of emergency response to environmental accidents, natural disasters and search and rescue in accordance with the law.
- The presidents of the People’s Committees of district and communes have the authority to mobilize human resources, facilities, accoutrements and materials from entities within their management for the purpose of emergency response and search and rescue in the district and/or commune in question.
- Arrange the regular budget and mobilize legal resources to implement emergency response to environmental accidents, disasters and search and rescue activities²⁰.

When accidents occur at the commune level, the Chairman of the communal People’s Committee is the commander of rescue operations. In case this person is absent, the captain of the Civil Defence Team or the authorized person is the rescue commander²¹.

3.4.2. Necessary activities

3.4.2.1. Prevention and preparedness

Planning land use around the IZ

Local authorities should perform the following tasks:

- Coordinate with MBIZ in planning the IZ in the area under their management.
- Issue decisions to permit the arrangement of schools, hospitals, commercial centres, residential areas, resettlement areas, roads, etc. around the IZ, ensuring that the safe distances prescribed by law are respected.

Planning for prevention of and response to environmental accidents

Local authorities at all levels have the responsibility to guide, supervise and put pressure on local establishments to implement regulations on the formulation and implementation of plans for responding to environmental accidents for IZs, in accordance with on the environmental protection of IZs²². In implementing this content, local authorities should achieve the following:

- Develop comprehensive planning processes between the public and private sectors to address the needs

²⁰ Vietnam Government (2017). *Decree No. 30/2017/NĐ-CP regulation on emergency response to accidents, natural disasters and search and rescue*

²¹ Vietnam Government (2017). *Decree No. 83/2017/NĐ-CP regulation on rescue operations by fire departments.*

Available online at <https://vanbanphapluat.co/decrees-83-2017-nd-cp-regulation-on-rescue-operations-by-fire-departments>

²² Ministry of Natural Resource and Environment (2017) *Official Letter No. 5183/BTNMT-TCMT on implementing and supervising the prevention, response and recovery to environmental accidents and Circular No. 35/2015/TT-BTNMT dated June 30, 2015. Providing for the environmental protection of economic zones, industrial parks, export processing zones and hi-tech parks.* Article 12. Available online at <http://extwprlegs1.fao.org/docs/pdf/vie168540.pdf>

of communities to maintain independence, medical care supervision, transportation and communication.

- Develop an emergency response plan for all identified risks in order to ensure community evacuation, shelter preparation and health care equipment in the event of an accident or disaster.
- Obtain information on potentially affected hazardous sites in order to assess the risks to health and determine the appropriate risk management measures. This includes the development of risk profiles to determine which potential emergencies to prioritize for planning.
- Develop a neighbourhood evacuation plan and contact the local emergency management office in order to find out ahead of time which evacuation routes have been designated for the area in question. Local authorities should also distribute maps to community members and become familiar with the major and alternate routes for leaving target areas prior to a disaster.
- Coordinate emergency plans with local schools and ensure that children know where to meet parents in the event of schools being evacuated.
- Identify members of the community who have particular skills (medical, technical) or equipment that they would be willing to share in the event of an emergency.

Box 3: Regulations on organization and activities for emergency response to accidents, natural disaster and search and rescue for local authorities

Local authorities (People’s Committees at district and commune levels) have established the Steering Committee for Natural Disaster Prevention and Rescue of districts or communes, proactively formulating and approving plans for response to accidents, natural disasters and search and rescue at local levels, implementing plans and mobilizing the forces, means and supplies of localities, central agencies and organizations located in the target localities to perform the tasks of responding to accidents, natural disasters, and search and rescue of victims under the direction of the superior agency for emergency response to accidents, natural disasters and search and rescue. The annual plan for natural disaster prevention and rescue should be adjusted to suit the actual situation in each period²³.

Local authorities should combine the development of a plan for prevention, preparedness and response to environmental accidents with a plan for response to accidents, natural disaster and search and rescue. This combined plan should be regularly tested, reviewed and updated as needed (for instance, when new risks arise, a work has been removed, a new residential or commercial area has been built, improvements made in equipment and response capacity, lessons learned from recent accidents, etc.), in order not to ignore any new emerging threats, as well as to cover all related parties.

²³ Vietnam Government (2017). *Decree No. 30/2017/NĐ-CP regulation on emergency response to accidents, natural disasters and search and rescue.* Article 30.

Communication and education for the community

Local authorities use mass media and other forms according to their functions and tasks to propagate and raise awareness, consciousness and responsibility and to disseminate basic knowledge to the entire population on the emergency response to environmental accidents, natural disasters and search and rescue²⁴. People’s Committees in communes, wards and towns (referred to as “commune level”) will be responsible for overseeing escape skills and providing essential knowledge on rescue for civil defence forces, individuals and households in the locality²⁵. In order to strengthen the capacity of the community, local authorities in the areas in which IZs are located should build communication and education programmes for the community with the following contents:

- Ensure complete interoperable communication capabilities between all responder organizations within the region.
- Inform the community about evacuation routes, temporary shelters and other emergency procedures.
- Provide information on the dangers of different types of natural and environmental accidents and vulnerable IZs. This is particularly important for the segments of the population who live in vulnerable areas.
- Provide training to a significant proportion of the community. Individuals are not prepared for an emergency situation, while experience says that citizens need to prepare to be self-sufficient during the initial 72 hours of a catastrophic accident.
- Provide training on safety measures in the case of different types of emergencies and first aid measures, for instance decontamination after a person is exposed to chemicals.
- Provide education for the community on warning systems that ensure public awareness of accidents, procedures and safety measures.
- Provide information for the community on when and how to contact local authorities and how the poison centre can help them and the community in the case of an emergency.
- Create a list of home and work telephone numbers and e-mail addresses for all community members, noting contact information and plans for children and seniors who may be home alone during emergency situations.
- Organize mock drills for responding to accidents, natural disasters and search and rescue for community, specialized and part-time forces under the guidance of the higher-level People’s Committees. This could be carried out in collaboration with the MBIZ and investors. Mock drills should be performed regularly and the emergency response plan improved after the drills.

3.4.2.2. Emergency response

In the case of environmental accidents, local authorities (at different levels depending on the severity and scale of the accident), should carry out the emergency response procedure, bearing in mind the elements outline below.

²⁴ Vietnam Government (2017). *Decree No. 30/2017/NĐ-CP regulation on emergency response to accidents, natural disasters and search and rescue*. Article 30.

²⁵ Vietnam Government (2017). *Decree No. 83/2017/NĐ-CP regulation on rescue operations by fire departments*. Article 7.

Available online at <https://vanbanphapluat.co/decrees/83-2017-nd-cp-regulation-on-rescue-operations-by-fire-departments>

Decentralized responsibility and coordination

- If the accident and rescue situations occur in localities (communes, wards and towns), authorities must take the initiative in organizing the response and remedy of consequences. If the situation is beyond the local self-coping capacity, authorities must report to the immediate superior Steering Committee for Disaster Prevention and Rescue (districts) in order to promptly mobilize forces for support.
- If the accident and rescue situations occur in a wide range of localities, the Steering Committees for Disaster Prevention and Rescue in the localities in which the situation occurs should coordinate to respond²⁶.
- If the accidents occurring in IZs affect residential areas, local authorities must directly inform the superior People's Committees and MBIZ (provincial level) to coordinate with enterprises to handle the situation.

Identify and collect necessary information

The local authority will identify the hazard and assess the needs for local or national help centres and safety measures.

- Receive information about accidents, natural disasters and search and rescue needs, including the type of emergency, where and when it has occurred.
- Notice. After receiving information related to accidents, the natural disasters occurring and the search and rescue needs, the People's Committee is responsible for notifying the relevant people, authorities and organizations, and for reporting to the standing body of the Committee for Disaster Prevention, Control and Rescue, as prescribed.
- Identify the hazard, for instance the type of contamination, whether chemical, gas or infection.
- Identify the degree of emergency – how many people are contaminated, injured or exposed, what are their symptoms, and how serious are they? What is needed – antidotes or first aid?
- Seek information from specialists about health effects, technical details and safety measures.
- What is the situation? Which resources are needed in order to control the situation? Is the site secure, does it have sheltering or is evacuation needed?
- Assess the emergency resources and determine whether further assistance, such as firefighters a poison centre, etc. is required.
- Inform the public, if necessary.

Health risks assessment

- Review the health effects or contamination/exposure, in cooperation with experts.
- Define the affected areas and population (exposed, victims, etc.).
- Consider collecting data from the exposed people, animals or environment.

²⁶ Vietnam Government (2017). *Decree No. 30/2017/NĐ-CP regulation on emergency response to accidents, natural disasters and search and rescue.* Article 10.

Emergency plan implementation

- In the event of an accident occurrence, based on the case level, local authorities need to immediately provide the field command headquarters with all of the necessary equipment to work around the clock. The information system for commanding the field is connected to the immediate superior Steering Committee for Natural Disaster Prevention and Rescue and the National Committee for Emergency Response to accidents and natural disasters and Search and Rescue for direction.
- Direct the implementation of emergency measures to protect the lives and properties of the people and the state, inspect works, means and forces that can be mobilized and used when necessary; run and command the forces, means, equipment and supplies used exclusively for emergency response, search and rescue and consequence recovery²⁷ and coordinate the different resources, including the fire department, poison centre, responders etc.
- Coordinate an emergency plan that focuses on (i) reducing the threat to human lives, (ii) protecting against further environmental damage, (iii) containing biological, chemical or radiation hazards, controlling the situation, containing the contaminated areas and setting up barriers and warnings and (iv) transporting victims to a treatment centre, hospitals, etc.

3.4.2.3. Follow-up to accidents

Avoiding secondary hazards

- Control secondary hazards, such as fire, fallen buildings, etc.
- Restore infrastructure, water supply, electricity, etc.
- Clean up the site when the immediate danger has passed.
- Continue communication with the public on contaminated areas, the need for evacuation, safety procedures and the necessary time and location of evacuation, etc.

Monitoring and health care

- Provide facilities for people to obtain health care.
- Protect evacuation sites from contamination.
- Follow up on the people affected by the contamination.
- Begin a register of exposed individuals and those suffering symptoms.

Evaluation and improvement of emergency response plan

- Participate with stakeholders in the assessment of short-term and long-term consequences for public health and the environment.
- Evaluate the situation and emergency response.
- Improve planning, coordination, response, recovery, etc. Incorporate important

²⁷ Vietnam Government (2017). Decree No. 30/2017/NĐ-CP regulation on emergency response to accidents, natural disasters and search and rescue. Article 13.

lessons learned from the experience into the emergency plans.

- Develop training programmes and request the resources needed, such as information or others.

Compensation and relief²⁸

- Request compensation for environmental damage caused by pollution and degradation in areas under their management.
- Develop and implement plans for restoring life, economy and environmental rehabilitation.
- Pay costs from the state budget for organizations and individuals involved in emergency response and search and rescue activities.
- Participate in the coordination of relief resources, ensuring relief to the appropriate people.

3.5. GUIDANCE FOR ENTERPRISES INSIDE IZS

3.5.1: Roles and responsibilities

Enterprises inside the IZ have the responsibility to perform the following:

- Comply with regulations on public security and order, ensuring OSH, corporate culture, environmental protection, fire and explosion prevention and control.
- Cooperate with police forces and the competent authorities in formulating plans for fire and explosion prevention and control, ensuring public security, order and social safety in the target areas²⁹.
- Prepare and issue accident prevention and emergency response plans at the workplace, organize rescue forces to provide emergency response and promptly report to responsible persons when detecting risks liable to cause working accidents or technical accidents endangering OSH at the workplace that are beyond the control of employers.
- Employees themselves have the responsibility to comply with OSH regulations, safety procedures and measures at the workplace, to comply with agreements on OSH as stated in the labour contract and the collective labour agreement, to promptly report to responsible persons any technical accidents endangering OSH, working accidents or diseases and to proactively participate in the provision of first aid and remediation of consequences of the accidents or working accidents according to the accident prevention and emergency response plans or the orders of the employer or competent state authorities³⁰.

²⁸ Vietnam Government (2015). *Decree No. 03/2015/NĐ-CP on environment damage assessment*. Available online at <https://vanbanphapluat.co/decre-no-03-2015-nd-cp-on-environmental-damage-assessment>; Vietnam Government (2017). *Decree No. 30/2017/NĐ-CP regulation on emergency response to accidents, natural disasters and search and rescue*

²⁹ Vietnam Government (2018). *Decree no. 82/2018/NĐ-CP dated May 22, 2018. Management of industrial parks and economic zones*. Article 31. Available online at https://eipvn.org/wp-content/uploads/2018/09/N%C4%90-82_2018_NĐ-CP_English-version.pdf

³⁰ Vietnam National Assembly (2015). *Law on Occupational Safety and Health*. Article 6 and article 16. Available online at <http://www.molisa.gov.vn/en/Pages/Detail-document.aspx?VID=639>

3.5.2. Necessary activities

3.5.2.1. Prevention and preparedness

Enterprises with the potential to cause environmental accidents must take the following prevention measures³¹:



Environmental accident prevention measures are implemented alongside the operation of an enterprise.

Planning for prevention of and response to environmental accidents

Enterprises need to make plans to prevent and respond to accidents occurring in their factories. The main content of the prevention and response plan to environmental accidents for enterprises in IZs can be found in Appendix 3. Enterprises that use, transport or produce chemicals need to develop plans/measures to prevent and respond to chemical accidents in the industrial field, according to current regulations³².

For employees, enterprises should develop a simple and easy-to-understand emergency response procedure for environmental accidents in the workplace, ensuring that all employees understand what needs to be done in the event of an accident. An example of an emergency response procedure for employees can be found in Appendix 4.

Enterprises manufacturing, transporting or trading chemicals could refer to the plan/measures for chemical accident prevention and response in the industrial sector, which can be found in Appendix 6 of Circular no. 32/2017/TT-BCT. An example of the steps needed to develop the prevention content for environmental accidents as a result of hazardous chemical emissions can be found in Appendix 5.

³¹ Vietnam National Assembly (2014). *Law on Environmental Protection*. Chapter X, Section 3 on environmental prevention, response, remediation. Available online at <http://extwprlegs1.fao.org/docs/pdf/vie168513.pdf>

³² Ministry of Industry and Trade (2017). *Circular no. 32/2017/TT-BCT - Specifying and guiding the implementation of a number of articles of the Law on Chemicals*; Vietnam Government (2017). *Decree no. 113/2017/ND-CP- Detailed regulations and guidance on the implementation of a number of articles of the Law on Chemicals*.

Applying measures to prevent accidents

1: Fire and explosion prevention³³

- An internal road system may ensure fire engines come in and out conveniently, while water spray from fire engines should reach any location in factories or warehouses that generate fire,
- Install automatic fire extinguishing systems for warehouses.
- Regularly check the electrical system to avoid electric shock.
- Firefighting equipment located in places where they can be easily seen and reached.
- Build firefighting water tanks with satisfactory capacity at factories.
- Provide FPF rules to all employees.
- Develop a procedure for businesses to respond to fire and explosions.

2: Chemical accident prevention

- Implement regulations on declaration and labelling of chemicals, make and store chemical safety sheets.
- Chemicals used in production should be contained in sealed containers and bags, labelled and gathered in separate areas and isolated from areas prone to sparks. Containers must be made of materials resistant to the type of chemicals stored and should be durable, guarding against collision (for instance iron or hard plastic) and with a tight lid. Before use, a container should be thoroughly cleaned if it has previously contained another chemical. In the process of warehousing, it is necessary to carefully check the containers and packing to ensure that there are no cracks in the container, nor tearing of the packaging, which may cause leakage of chemicals.
- Purchase and store a sufficient quantity of chemicals to use.
- In order to avoid chemical overflow, spills and leaks in stores, chemicals must be well balanced, arranged and placed in specified areas. Chemicals that are stacked, especially if stacked higher than the prescribed height, can cause tilting (for drums, cans when stacked should have no more than two layers, with the height of lots not exceeding 2 m and a minimum path between the lots of 1.5 m). Each lot must be marked, while a nameplate on the wall will facilitate inspection and supervision.
- Equipment and storehouses must be surrounded by barriers made of chemical-resistant materials, in order to prevent leaking.
- Managers must regularly check the transportation and storage of chemicals in warehouses. In particular, they should strengthen inspection, in order to overcome the dangerous conditions of chemicals production and trading.
- Organize and participate fully in training courses on chemical safety techniques, in accordance with regulations.

³³ Vietnam National Assembly (2001). *Law on Fire Prevention and Fighting*. Available online at <https://vanbanphapluat.co/law-no-27-2001-qh10-of-june-29-2001-on-fire-prevention-and-fighting>; Vietnam National Assembly (2013). *Law on Fire Prevention and Fighting*; and Vietnam Government (2014). *Decree no. 79/2014/ND-CP detailing the implementation of some articles of the Law on Fire Protection and fighting 2001 and 2013*. Available online at <https://danang.eregulations.org/media/ND%2079%20CP%20hd%20luat%20PCCC%202014%20E.pdf>

3: Oil spill prevention (for enterprises producing, trading and using petrol and oil)

- Regularly check petrol and oil leaks over the whole system, such as storage tanks, pipelines, valve assembly and equipment, that can be remedied in time. Periodically calibrate and check equipment such as safety valves, reflux valves, manometers and flowmeters.
- Provide the tools available for coping with oil spills, specialized blocking dams and recovery equipment to control the spread of petrol and oil.
- Buildings and works that use open flames must be at least 30 m away from places at risk of oil or petrol leakage, spillage and vaporization.
- Fully comply with regulations on FPF approved by the appropriate FPF police.

4: Accident prevention during operating compressors and generators:

- Air compressors and pressure tanks are operated only when granted registration for use.
- Generator/air compressor rooms must always be airy when operating, must have exhaust gas pipes leading out of the room and must be equipped with a suitable CO₂ fire extinguisher placed in the most convenient position for management and use in case of a fire. Do not use foam fire extinguishers type A or B. Smoking is strictly prohibited in the engine room, when running.
- The machine case must be grounded with a multicore flexible cable with a copper earthing board. Regularly check the pipeline and joints.
- The machine must be stopped immediately in the event of phenomena such as the temperature of oil, water, bearings and generators increasing beyond the allowed limit; pressure exceeding the value limit; rotation speed increasing or decreasing excessively; a progressive increase in the tapping and beating sound of metal or vibrations; sparks or smoke appearing in the machine; excessive and unusual discharge of brushes and commutators.

5: Accident prevention for waste treatment systems:

- The designed capacity of the wastewater treatment system or of waste containers/lakes ensures no overload capacity of the system.
- Regularly check the sewage pipeline and limit the leakage or spillage of sewage caused by pipe breakage.
- Regularly check, maintain and clean piping systems, filtration equipment, exhaust fans and other equipment of exhaust gas treatment systems.

Education, training and mock drills

The employer is responsible for organizing OSH training in accordance with the law. The training content and time should be developed for each different target group³⁴. Enterprises should coordinate with the FPF police to organize periodic training, drills, propaganda and guidance on FPF. The basic contents related to environmental accident prevention can be summarized as follows:

³⁴ Vietnam Government (2016). *Decree No. 44/2016/NĐ-CP details some articles of Law on Occupational Safety and Health*, Chapter III. Available online at <https://vanbanphapluat.co/decree-44-2016-nd-cp-details-law-occupational-safety-sanitation-technical-inspection-occupational-safety>

- System of policies and laws on OSH.
- Basic knowledge of dangerous and toxic factors and of machines, equipment, supplies and substances that have potentially dangerous and toxic factors.
- Analysis and assessment of risks and development of emergency response plans.
- Measures to prevent and reduce risks.
- Safe working procedures for machines, equipment, supplies and substances that need strict OSH requirements.
- Actions necessary when accidents occur (including first aid for working accidents).

Training is conducted periodically, either for new members of staff before they begin work, when there is a change in work, changes in equipment, technology and training or after working time off. In addition, employers are responsible for organizing professional training on rescue for specialized FPF forces and a FPF team of enterprises³⁵. They are also responsible for organizing mock drills on environmental accident emergency response for employees within enterprises, as well as for coordinating with other enterprises in the IZ. An example of the steps of mock drills with chemical spills or leaks can be found in Appendix 6.

Box 4: Some environmental accident scenarios for enterprises to organize mock drills

Firefighting:

The hypothetical fire situation occurs at Garment workshop no. 1 of Factory “X” in an IZ, with an electrical system failure the cause of the fire. Combustibles are mainly plastic, cotton, fabric, etc., meaning that the spread rate is fast, the temperature high and the smoke covered. There is therefore a risk of fire spreading to adjacent rooms of the building spreading more widely.

Chemical leakage/spillage:

While bringing chemicals from a tank truck carrying 15 tonnes of hydrochloric acid into a tank of Company “Y” in an IZ to serve production, there is a sudden leak at the company’s tank.

Natural disaster causing environmental accidents:

In the morning, a very strong tornado sweeps across the IZ in which chemical factory “Z” is located. The swirling tornado causes a number of corrugated iron roofs, electric plates and engine-shielding structures to fly up and collide with the spirit-level of the hydrochloric acid tank, causing a breakage in the spirit-level and a subsequent flowing out of the acid. The quantity of acid leaking is quite large and smoke rises up.

³⁵ Vietnam Government (2017). *Decree 83/2017/NĐ-CP- Regulation on rescue operations by fire departments*. Article 7. Available online at <https://vanbanphapluat.co/decrees-83-2017-nd-cp-regulation-on-rescue-operations-by-fire-departments>

Comply with OSH regulations

1: Develop collective labour agreement

Enterprises need to develop collective labour agreements, a written agreement between a labour collective and the employer with regard to the working conditions agreed upon by both parties through collective negotiation³⁶. In the collective labour agreement, employers need to make agreements and responsibility commitments for employees and other stakeholders regarding compliance with regulations on safe operation of equipment, implementation of legal regulations and the rules of enterprises in relation to OSH and environmental accident prevention.

2: Develop safe work procedure

Employers should ensure that each installation within an enterprise has written and easily accessible operating procedures and instructions, in order to satisfy the design intent of the installation and meet relevant safety standards, codes and guidance that ensure that the equipment, plant and premises provide a safe place of work under both normal and abnormal operating conditions. Procedures should be established at storage facilities and those where hazardous installations are present, in order to minimize the risks of accidents and, in particular, to prevent the degradation of hazardous substances or packages, labels or other markings.

3: Equipment inspection, maintenance and repair

Management of hazardous installations should establish programmes for the regular maintenance, inspection and testing of equipment, in order to ensure that it is at all times fit for the purpose for which it was designed. Local management at each hazardous installation should regularly inspect and maintain emergency alarms, protective and emergency equipment and all devices critical to the orderly shutdown of operations, in conjunction with the relevant public authorities (where appropriate).

4: Provide personal protective equipment

Employers should provide their employees with adequate and good quality personal protective equipment, in accordance with the law³⁷ and including the necessary facilities for emergency response.

Take measures to eliminate the cause of environmental accidents

Enterprises (including employees, safety activists, OSH officials, workshop managers and employers) are responsible for implementing or requesting that the competent authorities take prompt measures to eliminate risks that can cause accidents when detecting signs of environmental accidents.

3.5.2.2. Emergency response

Information, notifications and alarms

Information on accidents that require response and rescue activities must be reported promptly to the police and rescue authorities using telephone number 114 or to local authorities and the nearest police force³⁸.

³⁶ Vietnam National Assembly (2012). *Vietnam Labour Code*. Article 73.

Available online at <https://www.ilo.org/dyn/natlex/docs/MONOGRAPH/91650/114939/F224084256/VNM91650.pdf>

³⁷ Ministry of Labour - Invalids and Social Affairs (2014). *Circular No. 04/2014/TT-BLĐTBXH - Guiding implementation of regulations on personal protective equipment*. Available online at <http://www.molisa.gov.vn/en/Pages/Detail-document.aspx?VID=619>

³⁸ Vietnam Government (2017). *Decree 83/2017/NĐ-CP- Regulation on rescue operations by fire departments*. Article 7. Available online at <https://vanbanphapluat.co/decree-83-2017-nd-cp-regulation-on-rescue-operations-by-fire-departments>

Enterprises suffering oil spill accidents are responsible for promptly reporting the occurrence to one of the following agencies: Provincial DoNRE, the nearest local authorities and local search and rescue standing agencies³⁹.

For technical accidents that seriously endanger OSH, but for which the specialized laws do not stipulate the declaration, the implementation is as follows⁴⁰:

- Persons who discover or receive information of a technical accident seriously endangering OSH must immediately inform the employer of the enterprise in which the environmental accident has occurred or the communal People's Committee. The employer and the communal People's Committee shall immediately report to the district People's Committee where the accident has occurred.
- For technical accidents seriously endangering OSH related to a number of production and business establishments and localities, employers and localities in which the accident occurs have the responsibility to immediately report to District People's Committee and the PPC.

Accident handling and emergency response

Enterprises are responsible for handling technical accidents that seriously endanger OSH and emergency response, in accordance with the law.

Box 5: Responsibilities for handling technical accidents seriously endangering OSH and emergency response⁴²

1. Employers shall order the immediate stoppage of the operation of the machinery and equipment, of the use of supplies and substances and of working activities at the workplace that are likely to cause working accidents or technical accidents that seriously endanger OSH.
2. Employers shall implement remedial and other measures according to the plan for handling of technical accidents seriously endangering OSH.
3. Employers shall provide emergency rescue to save people and property, ensuring OSH for employees and people around the workplace, property and the environment, as well as promptly notifying the local administration of the location at which the accident or emergency rescue is taking place.
4. The employer of the production and business establishment or the locality where the accident occurs shall urgently mobilize manpower, materials and facilities to respond promptly to the accident, in accordance with specialized laws.
5. Upon the occurrence of a technical accident seriously endangering OSH that is related to a number of production and business establishments or localities, the employers or the localities in which the accident occurs shall respond to the accident and report it to the immediate superior agency, in accordance with specialized laws.

³⁹ Prime Minister (2013). *Decision No. 02/2013/QĐ-TTg - Regulation on oil spill response*. Available online at <https://vanbanphapluat.co/decision-no-02-2013-qd-ttg-promulgate-the-regulation-on-oil-spill-response>

⁴⁰ Vietnam Government (2016). *Decree No. 39/2016/NĐ-CP detailing a number of articles of the Law on Occupational Safety and Health*. Article 26. Available online at <http://www.molisa.gov.vn/en/Pages/Detail-document.aspx?vID=659>

⁴¹ Vietnam National Assembly (2015). *Law on Occupational Safety and Health*. Article 19. Available online at <http://www.molisa.gov.vn/en/Pages/Detail-document.aspx?vID=639>

Response activities in some specific environmental accidents

1: Spill or leak of chemicals or other hazardous substances

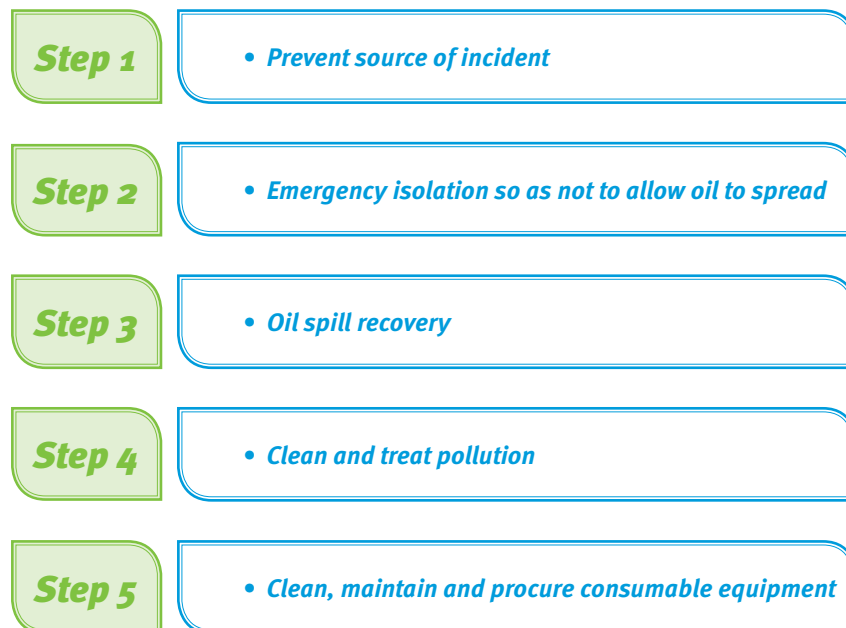
In the event of a leak of chemicals, gas or other hazardous substances, individuals who cause or detect these accidents have the following responsibilities:

- Notify the supervisor of that area and evacuate people if necessary.
- Review the safety information of spilled chemicals.
- Isolate and ventilate chemical spill areas and isolate all ignition sources.
- Recover or absorb spilled chemicals with inert material, then store them in a closed waste container and dispose of them.
- Clean spill/leak areas and do not discharge into general drainage systems.

In addition, respondents should notify the relevant body of any persons who may have been poisoned. Contaminated clothing must also be removed, using plenty of water to wash the skin (clean for at least 15 minutes). Clothes should subsequently be washed before reuse.

2: Oil spill

For oil spills, the following five basic steps should be performed to respond to accidents and post-accidents⁴²:



⁴² Centre for Environment Safety Response (2018). *Improve basic oil spill response skills for enterprises in Hai Phong city.*

The specific emergency response activities to be carried out are as follows⁴³:

- Close, lock and turn off electricity at all sources of petrol and oil in warehouses. Isolate and delineate the initial isolation area with a radius of up to 1 000 m (depending on the actual accident) and remove all sources of ignition in the isolation area.
- In the case of oil spilling out of the embankment, embank the dike with oil fence buoys or specialized chemicals to prevent spreading. Use means to create channels, ditches or pits or to create obstructions. Navigate the flow into storage pits, low-lying areas, deep pools, channels, etc., in order to facilitate recovery and prevent the oil from flowing into water sources, sewer systems and residential areas.
- Use specialized means capable of absorbing liquids (tank trucks, fire engines, waste trucks, military disinfection vehicles, gasoline/oil pumps, buckets, pots, etc.) to recover gasoline and oil in the dike area and put it into containment equipment, limiting fuel evaporation. The fuel recovered will be separated by impurities and reused.
- Organize the evacuation of unrelated staff from the accident area.
- Deploy the fixed firefighting system of the facility, the cooling system for tanks inside the dike area and equipment and workshops outside of the accident area in order to reduce the risk of the fire spreading.
- Implement firefighting measures according to the FPF plan and rescue forces of the locality, focusing mainly on major fires in the dike area.

Figure 4: Pictures of oil spill prevention measures⁴⁴



⁴³ Thanh Hoa PPC (2016). *Decision approving the chemical accident prevention and response plan in Thanh Hoa province.*

⁴⁴ Centre for Environment Safety Response (2018). *Improve basic oil spill response skills for enterprises in Hai Phong city.*

3: Fire and explosion

In case of fire and explosion, enterprises need to implement the fire and explosion response procedure, which has been built and drilled by enterprises.

Box 6: Actions that need to be taken by individuals who cause or detect fire accidents⁴⁴

1. Action upon discovering a fire

- Raise the alarm by ringing the bell or breaking the nearest RED “Break Glass Box” which is positioned inside and adjacent to all EXIT doors from plant buildings, or by other methods imparted during training or guidance.
- Shout for assistance or warn other employees nearby.
- Fight the fire or assist in an emergency accident only if safe to do so.
- Do not endanger your own safety or that of others.

2. Action upon hearing the alarm

- Remain at your place of work if safe to do so.
- Prepare to shut down equipment.
- Leave the building upon hearing the EVACUATION ALARM or upon being told to do so by a manager, supervisor or person(s) in charge.
- Go to the Assembly Area.

3. Evacuation

- Go immediately to the Assembly Area via the safest route.
- Do not stop to collect personal belongings.
- The last person leaving a room/hallway should close the door behind them.
- Do not re-enter the building until directed to do so.
- Do not leave the Assembly Area until directed to do so.

Figure 5: Firefighting facilities in Tra Noc IZ (Can Tho City)



⁴⁵ Medite Europe Limited (2010). *Environmental emergency response procedure*. Available online at http://www.epa.ie/licences/lic_eD-MS/090151b2803d80d3.pdf

4: Natural disasters

In the event of a natural disaster (storms, tropical low pressure, heavy rain, floods, flash floods, surges, flood tide, landslides or land subsidence because of flooding or stream flow), it is necessary to protect both businesses and workers from damage.

Secure production and office area

- Implement measures to ensure safety for houses and equipment. Cover windows and close doors. Cover and move equipment/furniture to a secure area.
- Proactively implement measures to protect production.
- Always protect your data with backup files.
- Make provisions for alternative communications and power.
- Make plans to resume work with limited resources (water/power).
- Store emergency supplies at the office.

Protect employees

- Evacuate employees from dangerous areas and areas where safety is not ensured.
- Consider providing shelter to employees and their families and helping them with supplies in the aftermath of a disaster.
- Establish a meeting point for employees in the event of a building or office evacuation.
- Establish a call-down procedure for warning and post-storm communications.
- Conduct search and rescue activities and first-aid, support food, medicine, drinking water and other essentials in the divided areas, seriously flooded areas and evacuation locations.
- Provide photo IDs to staff.

For accidents occurring during the operation of machinery/equipment, response procedures should be developed separately for each type of machine.

3.5.2.3. Follow-up to accidents

Enterprises in which environmental accidents occur are responsible for the implementation of the following activities:

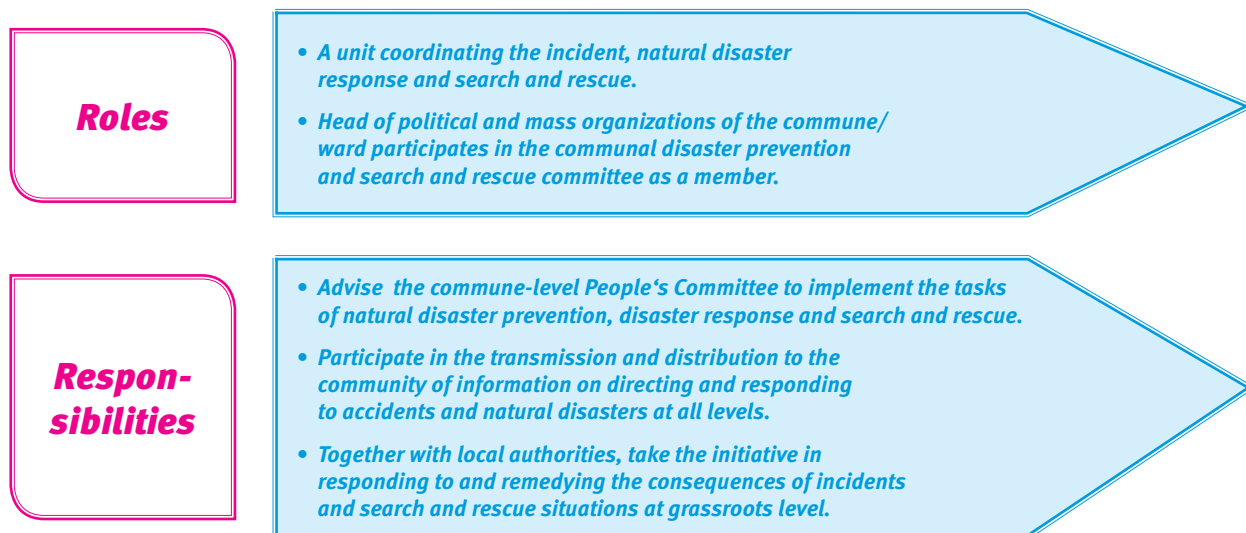
- Comply with the requirements of state management authorities on environmental protection, labour and OSH during the investigation process and determine damage scope and level, the causes of technical problems and human and property losses.
- Immediately take measures to limit the sources of environmental pollution and their spread, which might affect the health and life of people in the region.

- Implement measures to remedy pollution and restore the environment at the request of state management authorities on environmental protection.
- Compensate for damage according to the provisions of the relevant laws (such as the Law on Environmental Protection, Labour Law, etc.).
- Produce reports for local authorities, trade unions, state management authorities on labour and environmental protection on the results of inspection, investigation, compensation, implementation of environmental accident response and environmental remediation.

3.6. GUIDANCE FOR LOCAL MASS ORGANIZATIONS

Local mass organizations include political, political-social and social organizations at the commune/ward level. These, in turn, include the Fatherland Front, Red Cross Association, Women’s Union, Youth Union, Veterans’ Association, Farmers’ Association, Elderly Association (collectively referred to as commune-level mass organizations).

3.6.1. Roles and responsibilities



3.6.2. Necessary activities

3.6.2.1. Prevention and preparedness

For prevention and preparedness, local mass organizations need to achieve the following:

- Participate in developing plans, options for responding to incidents and search and rescue activities in the locality.
- Participate in training courses, coaching, rehearsals and meetings on transmitting basic knowledge and measures to respond to incidents, disasters and search and rescue, as organized or directed by the People's Committee.
- Participate in building on-the-spot forces to respond to incidents and forces for disaster prevention at grassroots level.
- Collaborate with local authorities at commune level to organize community meetings to disseminate information and guide escape skills, essential knowledge on rescue and the rescue of people.
- Coordinate with local authorities to inspect and pressure local organizations and individuals into performing the task of preventing incidents and natural disasters.
- Comment on environmental protection measures and chemical incident prevention and response plans for investment projects of establishments that produce and store dangerous chemicals in the localities.

3.6.2.2. Emergency response

Information, notifications and alarms

Upon receiving the official information warning from the competent authorities regarding oil spills/ leaks of chemicals, oil or other hazardous substances from enterprises in the IZs in the locality, the heads of the mass organization coordinate with commune-level authorities to broadcast the information on the loudspeaker system or through direct information (portable speakers, direct announcements, meetings, etc.) to the community, who will thereby know how to respond.

Accident handling and emergency response

In case of emergency, local mass organizations must carry out the following:

- Take part in determining the risk of pollution and the scale affected.
- Implement emergency measures, as assigned.
- Ensure safety for people in organizations involved in search and rescue. (See Box 7 below).

Box 7: Conditions to ensure participation in search

The people involved in search and rescue must have the following skills or experience:

- Training search skills provided by professional bodies or related authorities.
- Previous participation in rehearsals.
- Access to safety equipment at the emergency moment.

For instance, the Red Cross Association at commune level can participate in community-based first aid and medical care in emergency situations as it has a trained first aid team and basic first aid equipment.

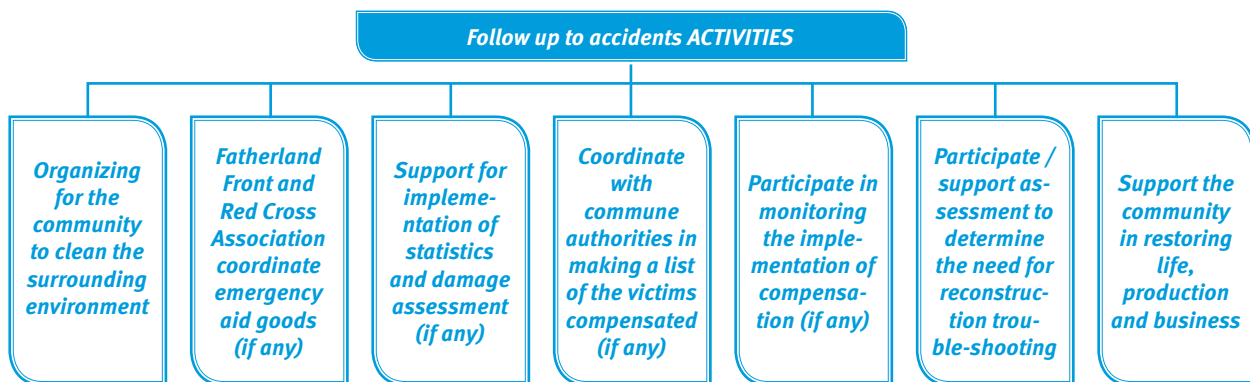
Encourage members to mobilize resources to respond.

- Report to the immediate superior agency and propose solutions to support the community.
- Coordinate the evacuation of people and assets, when required.

3.6.2.3. Follow-up to accidents

The mass organizations at commune level are responsible for implementing the activities described in the diagram below.

Figure 6: Diagram of post-accident activities of commune-level mass organizations⁴⁶



⁴⁶ Vietnam National Assembly (2013). *Law on Natural Disaster Prevention and Control*. Article 33. Available online at https://www.ifrc.org/Global/Publications/IDRL/Law%20on%20Natural%20Disaster%20Prevention%20and%20Control_No%20%2033_IFW.pdf

3.6.3. Supporting facilities

3.6.3.1. Prevention and preparedness

- Use of mass media (loudspeakers, radio, television and other forms such as leaflets, printed materials, etc.) according to their functions and tasks for the propagation of awareness-raising on attitude, responsibility and universal knowledge for the entire population in response to accidents, natural disasters and search and rescue⁴⁷.
- Use of mass media (telephone, radio, television) to capture forecast information on environmental accidents from competent authorities and related units and organizations, including MBIZ and the District Steering Committees for Natural Disaster Prevention and Rescue.

3.6.3.2. Emergency response

Use of rescue facilities, rescue and fire protection is available locally to respond to accidents.

3.6.3.3. Follow-up to accidents

- Use of statistical forms of damage prescribed by the State, to support local authorities in declaring damage.
- Use of donations and support for domestic and foreign organizations and individuals, within their functions, to support damaged households and individuals.
- Use of the credit system within the scope of management authorization to support damaged households and individuals in restoring their economy and stabilizing their life. In some localities, for instance, the Fatherland Front, Women's Union or Farmers' Union are authorized by some banks to manage microcredit.

3.7. GUIDANCE FOR HOUSEHOLDS AND INDIVIDUALS

3.7.1. Roles and responsibilities

Households and individuals have the following roles and responsibilities⁴⁸:

- Citizens aged 18 or above and who are physically fit have the responsibility to participate in

⁴⁷ Vietnam Government (2017). *Decree No. 30/2017/ND-CP dated March 21, 2017 regulating organisation, activities to respond to accidents, natural disasters and search and rescue*, Article 16.

⁴⁸ Vietnam National Assembly (2001). *Law on Fire Prevention and Fighting*. Article 5. Available online at <https://vanbanphapluat.co/law-no-27-2001-qh10-of-june-29-2001-on-fire-prevention-and-fighting>; and Vietnam National Assembly (2013) *Law on Natural Disaster Prevention and Control*, Articles 21, 23, 30. Available online at https://www.ifrc.org/Global/Publications/IDRL/Law%20on%20Natural%20Disaster%20Prevention%20and%20Control_No%20%2033_IFW.pdf

civil defence teams and FPF teams at grassroots level or in places of work, when required.

- The head of the household is the person responsible for organizing activities and regularly inspecting prevention and fighting within the scope of his or her responsibility.
- Participate in information, communication and education activities on prevention and response to incidents and natural disasters.
- Actively prepare the necessary manpower, supplies, means and equipment to serve the activities of responding to incidents and natural disasters.
- Actively overcome the consequences of incidents and natural disasters for infrastructure and assets under management.
- Participate in supporting activities to overcome the consequences of incidents and natural disasters according to the mobilization of competent agencies.

3.7.2. Necessary activities

3.7.2.1. Prevention and preparedness

- Participate in training sessions on escape skills and essential knowledge on rescue, organized by the People’s Committee at commune/ward/town level or by functional agencies⁴⁹ and subsequently recirculated to family members;
- Participate in training on FPF organized by local authorities or FPF authorities designed for participants to master the necessary knowledge about FPF, to understand how to use common FPF tools and means and organize the propagation, education and dissemination of FPF laws and knowledge for their family members⁵⁰.
- Households prepare conditions and means for FPF⁵¹.
- Households and individuals in high-rise buildings need to regularly check emergency exits – specifically that there are no obstacles and that exits are not locked.
- Local authorities propose that MBIZ request that chemical enterprises in the IZs provide information on the chemical safety of production establishments and request that enterprises implement measures to protect the environment and people’s health⁵².
- When detecting environmental violations by enterprises in the IZs in the area (such as discharge of wastewater outside the industrial parks and not at the prescribed places; output of wastewater from the industrial wastewater treatment plant of the industrial park with abnormal phenomena affecting

49 Vietnam Government (2017). *Decree 83/2017/NĐ-CP- Regulation on rescue operations by fire departments*. Article 11. Available online at <https://vanbanphapluat.co/decrees-83-2017-nd-cp-regulation-on-rescue-operations-by-fire-departments>

50 Vietnam National Assembly (2001). *Law on Fire Prevention and Fighting*. Article 5. Available online at <https://vanbanphapluat.co/law-no-27-2001-qh10-of-june-29-2001-on-fire-prevention-and-fighting>; and Vietnam National Assembly (2013). *Law on Fire Prevention and Fighting*. Article 1.

51 Vietnam National Assembly (2001). *Law on Fire Prevention and Fighting*, Article 50. Available online at <https://vanbanphapluat.co/law-no-27-2001-qh10-of-june-29-2001-on-fire-prevention-and-fighting>

52 Vietnam National Assembly (2007). *Law on chemicals*. Available online at <https://www.ilo.org/dyn/natlex/docs/ELECTRONIC/80836/119230/F747782294/VBN80836%20Eng.pdf>

the surrounding environment, production and people's health; oil spills or chemical leaks out of IZs; smoke and dust dispersal that often goes into the environment, affecting human health, pets or production, business in the area, etc.), the relevant bodies should be informed in a timely and accurate manner, using one or more of the lines below (when doing so, the caller should inform the relevant bodies on who and where they are and what they see): (i) hotline of the Commune Authority, (ii) hotline of the Provincial DoNRE, (iii) hotline of the Viet Nam Environment Administration – 086 900 0660, (iv) hotline of the Viet Nam television programme “Alo Good morning VTV1” – 0858 247247.

- When there is sufficient accurate information about violating the provisions of the law on environmental protection of enterprises⁵³ in the IZ in the area, a proposal should be made to the local authorities to request that the competent authority suspend activities that cause pollution to the business or enterprise.
- Do not build houses and other works within the designated distance for dangerous chemical production and trading establishments, with the exception of specialized works permitted by competent state agencies⁵⁴.

3.7.2.2. Emergency response

The following presents environmental accident response activities for individuals and households for two typical types of accidents, namely (1) spills, leaks, dispersal of chemicals, oil, toxic substances, etc. and (2) fire and explosion from IZs.

1: Spill, leak or dispersal of chemicals, oil or other hazardous substances

The causes for this may include the following:

- Oil spill from enterprises or petrol stations in IZs due to operating techniques, the carelessness of operators or natural disasters (rain, storm, landslides, etc.).
- Toxic gases (ammonia, CO, CO₂, SO₂ and other toxic gases) or volatile organic substances disperse to residential areas from wastewater treatment plants or from certain production stages of enterprises in the IZ due to non-compliance with Vietnamese technical procedures and standards during operation or natural disasters.
- Dispersed dust exceeds the permitted standards in residential areas from production or transportation of enterprises in the IZ.
- Chemicals and hazardous substances spill over into residential areas due to carelessness, non-compliance with technical processes in preservation/production of enterprises in the IZ or as a result of natural disasters such as storms and floods or mudslides.
- Toxic substances from hazardous solid waste are dispersed due to improper collection, transportation and handling.

⁵³ Vietnam Government (2016). *Decree No. 155/2016/ND-CP. Penalties for administrative violations against regulations on environmental protection*, Item a, Clause 12, Article 14; Items a and b, Clause 7, Article 15; Items a and b, Clause 8, Article 16; Items a and b Clause 11 Article 17; Items a and b Clause 3 Article 18; Items a and b Clause 8 Article 19; Section a, Clause 12, Article 20; Item a, Clause 11, Article 21; Section b, c Clause 10 Article 22; Section c, d Clause 9 Article 23; Section b Clause 5 Article 26; Clause 4 Article 27; Items b, c, d, dd Clause 4 Article 34. <https://vanbanphapluat.co/decree-155-2016-nd-cp-penalties-administrative-violations-against-regulations-on-environmental-protection>

⁵⁴ Vietnam Government (2017). *Decree No. 113/2017/ND-CP detailing and guiding the implementation of a number of articles of the Chemical Law*, Article 22.

- Unpleasant odours arise from factories and enterprises in the IZ.
- Industrial waste leaks/spillage, possibly as a result of accidents during waste transportation or cracked/broken waste treatment tank.

The specific emergency response activities are outlined below.

Warning

- In the event of one of problems mentioned above, the situation should be promptly reported to the local authorities/DoNRE following the hotline, or to the Viet Nam Environment Administration on the following telephone number: 086.900.0660.
- Information and solutions should be provided to family members.

Emergency handling

In the event of spillage of chemicals or other hazardous substances:

- Use wet masks, medical masks and poison masks, if available.
- Use boots to move in flooded areas.
- Evacuate cattle and poultry while attempting to avoid poison from the affected area.
- Store furniture up and wrap or cover in plastic, newspaper, wrapping paper or sackcloth to avoid contaminated water or toxic gas seeping in.
- Stay indoors, close windows and doors and turn off the air conditioner. If there is a risk of contaminated water entering a home, sand/sandbags/sand sacks should be used to block the doors.
- Lock the tap water system if flooded with chemicals and clean water storage to prevent the poisoning of the clean water system, tank or well.
- Comply with the evacuation order when requested to do so by the competent authority.

In case of toxic gas emission:

- When informed of a toxic gas dispersal, or when feeling discomfort after becoming aware of a particular smell of gas, quickly cover the nose with a wet towel, mask, etc., in order to limit inhalation of toxic gases, before quickly moving away from the contaminated area.
- If this smell occurs outside, enter the house, close all doors and windows and turn off the air conditioner.
- Turn off gas stoves, wood stoves and do not smoke.
- If clothes with ammonium (with its characteristic stench) need to be removed (if pullovers are removed, avoid pulling them over the head and contact with chemicals), place them in a sealed plastic bag and remove them from the safe place in order to avoid infecting others⁵⁵.

⁵⁵ Uyen Huong (2017). Available at <http://giadinh.net.vn/ky-nang-song/cach-thoat-hiem-khi-bi-ngo-doc-khi-2017101708344231.htm>

In case of an oil spill:

- Evacuate uncontaminated cattle and poultry from the affected area.
- Store furniture high up. Use masks, medical masks and anti-toxic masks if large oil spills cause unpleasant odours.
- Use boots to move in areas flooded by oil spillage.
- Lock the tap water system if it is flooded and store clean water in the case of clean water and clean wells.
- Do not spread the fire to areas containing stagnant oil.
- Do not arbitrarily collect spilled oil. This will help to prevent health hazards, as well as preventing fire and explosion.
- Comply with orders to mobilize people, means and assets to respond to a local accident and to assist the search and rescue operations of competent persons.
- Comply with the evacuation order when requested to do so by the competent authority⁵⁶.



Do not use buckets, pots or other items to collect oil spills⁵⁶

2: Fire and explosion

The specific emergency response activities to be carried out are outlined below.

Warning

- Be calm and shout loudly to the surrounding people and family members to know what is happening and find a way of handling the situation.

Emergency handling

- Step 1: Break the circuit-breaker in the house.
- Step 2: Consider the level of fire. Use a fire extinguisher, sand, blanket, wet screen or water to extinguish the fire.

⁵⁶ Vietnam Government (2017). *Decree 83/2017/NĐ-CP. Regulation on rescue operations by fire departments*. Article 15. Available online at <https://vanbanphapluat.co/decrees-83-2017-nd-cp-regulation-on-rescue-operations-by-fire-departments>

⁵⁷ Quach Du (2018). Available online at <https://laodong.vn/xa-hoi/vu-tran-dau-o-thanh-hoa-nguoi-dan-do-xo-mang-can-ra-hot-dau-647356.ldo>,

Box 8: Note when calling 114 fire alarms

In order to be able to carry out rescue operations quickly, the reporter must provide the FPF police with the following three pieces of information:

- **“Who are you?”** Please give your full name and provide a telephone number for the firefighting force to contact you again.
- **“Where are you?”** Please provide the exact address of the fire or accident facility, which will help the fire police force to reach you as quickly as possible.
- **“What do you see?”** Please also provide information about the situation of the fire or characteristics of the accident, such as the type of house, the location of the floors affected, flammable substances and the status of victims.

- Step 3: If you feel that the fire cannot be extinguished, alert the nearest police officer or dial 114.
- Step 4: Move valuable property away from the fire.
- Step 5: If the fire cannot be extinguished, find any way out.

Safe way out

- 1: Check the door temperature by placing the back of your hand on the door. (Use the back of your hand rather than the palm of your hand as a burned palm will interfere with your escape if you need to crawl or get down a fire ladder). If the door is hot or very warm, do not open it.
- 2: If the door punch is cool and you do not see smoke around the door, go straight to the exit door of your home.
- 3: Find the nearest exit according to the indicator light or follow the notification via the radio system.
- 4: Use a wet towel (or mask, if available) to cover your face and nose to avoid toxic smoke when moving. Note that smoke is more dangerous than fire.
- 5: If you have to cross the fire, use blankets, towels and clothes to dip water on your head and body.
- 6: If there is a large amount of smoke, bend over when moving as this makes the oxygen concentration lower.
- 7: Move quickly to a safe position.
- 8: Do not use elevators. Only use stairs to escape.
- 9: If there is no entrance to the main door, move to the window or balcony, and call out or use a light cloth to signal.
- 10: Do not, under any circumstances, jump from a high floor, unless equipped with a cushion.

Figure 7: Safe exit posture when escaping from fire



What to do when you cannot get out immediately using the emergency exit⁵⁸

In these cases, you can exit from the window, if reasonable.

- Exit from the window if you are on the first/ground floor. Before doing so, remember to throw the blanket, pillow or cushion to the ground outside, in such a position that you will avoid hurting yourself when falling.
- If you are unable to open the window, break the door to find an exit (using a heavy object to break the corner under the door). When you exit, remember to use a cloth, towel, blanket, etc. to protect your body from being scratched by the broken pieces of the door.
- If there are small children needing to escape, you should keep them as close to ground level as possible before dropping them. It is best to have somebody who can help to ease the child/children out of the window.
- Lower your body by clinging to the door step before dropping yourself.

What to do if there is no way out?

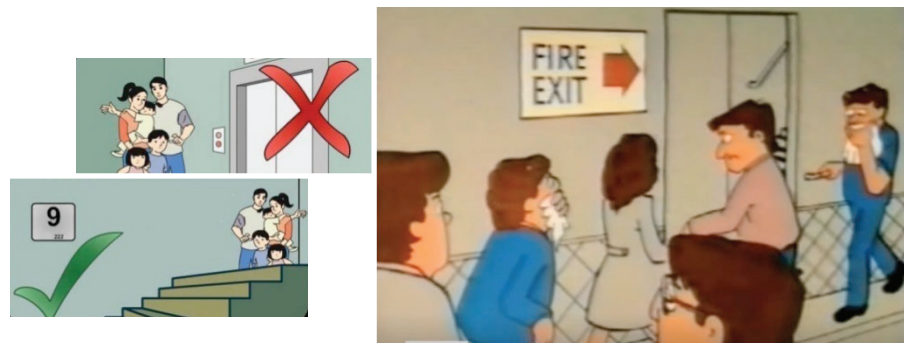
- 1: If you cannot find any way out of a place where a fire is burning, such as when there is no emergency exit or you are on a high floor, do not panic because you think that there is no escape.
- 2: Gather everyone in a room, preferably one with a window.
- 3: When toxic smoke enters the room/house, you and everyone in the house should use a wet cloth to cover your nose and mouth. Use a toxic filter mask, if available.
- 4: Prevent smoke and fire from entering the room by blocking the openings around the door with sheets, blankets wet clothes or tape.
- 5: Open the window or smash it (if opening does not help you to escape) and stand near the window to breathe and call for help. Doing this helps to avoid suffocation and affords you more time while you await help.

⁵⁸ Bao moi (2018). *Nine skills to escape the fire you should know*. Available online at <https://baomoi.com/9-ky-nang-thoat-khoi-dam-chay-ban-nen-biet/c/25373303.epi>.

- 6: The most important thing to be remembered is that, even if you are afraid, never hide under a bed or in a wardrobe or closet, as rescuers and firefighters will struggle to find you. Remember that the sooner firefighters and others find you, the sooner you will be out and safe.

If you are in a high-rise building, pay greater attention⁵⁹

- 1: When you find a fire in an apartment or high-rise building, try to calm down and determine where the fire or smoke is coming from and where to find the best escape route.
- 2: When the fire or smoke has not spread to the corridor you are in, run to the exit door. Close the door of the room you are staying in to stop the smoke. If you are unable to escape, you must return to your room.
- 3: Do not, under any circumstances, attempt to escape using the elevator, as the power in the building is immediately interrupted when a fire occurs, and you may become trapped while moving in the elevator. Escape using a stairway where there is an “Exit” light.



Only escape by stairs and by signpost⁶⁰

- 4: If there is a lifeline or a ladder, use it to escape. If not, take advantage of the strong wire available in the house to drop down. Note that sometimes the vertical curtain or wind-tied clothes can be an ideal “rope”. You must be careful, however, to wear a lot of clothes and roll a lot of rags in your hands before dropping this rope.
- 5: In any situation, do not escape by jumping from a high floor. In an emergency, jump only when there is an air cushion and a rescue network of firefighting forces below, and be guided by functional forces to an escape.

In case of fire and explosion from the IZ, causing your house to collapse⁶¹

- 1: The first time you feel that there is a risk of the house collapsing, calmly assess the situation, quickly leave the house, and be aware of your own life first. If you are in a high-rise building, check the location of the nearest staircase and avoid using the elevator in any circumstances.
- 2: In case of becoming trapped under rubble, you must find a way to signal to the rescue

⁵⁹ Fire Preventing and Fighting, Police Department of Hanoi City (2019). Available online at <http://pccchochiminh.com/ban-can-biet/106-lam-gi-khi-xay-ra-hoa-hoan.html>; FireSave (2019). Available online at <http://www.firesave.com.vn/index.php/vi/kien-thuc/kien-thuc-pccc/ba-n-pha-i-la-m-ga-khi-ca-cha-ya>; Nguyen Diep. Available online at <http://daihocpccc.edu.vn/ArticlesDetail/tabid/193/cateid/65/id/9793/language/vi-VN/Default.aspx>

⁶⁰ Nguyen Diep. Available online at <http://daihocpccc.edu.vn/ArticlesDetail/tabid/193/cateid/65/id/9793/language/vi-VN/Default.aspx>

⁶¹ Minh Trang (2016). Available online at <https://anninhthudo.vn/doi-song/thoat-nan-nhu-the-nao-khi-nha-bi-sap/695249>; Le Nhung (2015). Available online at <http://giadinh.net.vn/ky-nang-song/cach-de-song-sot-khi-sap-nha-20150925095914535.htm>.

force, allowing them to detect your whereabouts and respond in a timely manner. If your phone and flashlight are still usable, make sure that these are activated.

- 3: When the house is in imminent danger of collapse, run close to the big items nearest to you that contain a safe space.
- 4: If you are in bed, roll off the bed. A safe space will exist close to the bed.
- 5: Lie down and curl up into the foetal position next to a large object.
- 6: When the house is collapsing rapidly, never use the stairs (unless you feel it is safe) as the stairs and the rest of the building will continue to be unstable until the structure collapses.
- 7: Leave the building, if possible. The deeper you are inside the building, the more your escape route will be blocked and the greater the difficulty of rescuing you.
- 8: If you get stuck inside a bulky object, stay in one place and do not try to move, as this will increase the risk of serious injury and may cause other areas to collapse.
- 9: If you have to move, do so slowly and gently.

3.7.2.3. Follow-up to accidents

- Go to your medical facility to check your health status (potential poisoning or sickness caused by the impact of the accident).
- Check that the indoors and sanitation areas are clean following the accident.
- Destroy the poisoned cattle and poultry at the request of local authorities or other competent authorities.
- Do not come into contact with green vegetables, food crops, fruit trees, pets, etc. that may have become contaminated with oil and chemicals.
- Take photos of affected objects using your telephone or camera as a basis for declaring damage (if any).
- Declare material and human damages (if any).
- Propose that local authorities ask businesses to pay compensation for damages (if any).
- Planning and implementation of measures to overcome consequences.

3.7.3. Supporting facilities

- Hotlines to reflect and warn about accidents.
- Availability of fire extinguishers, toxic fumes, toxic gases, fire extinguishers, firefighting blankets, fire hose reels, water, rope ladder, insurance belts, covers, gas, clothes, wet towels, adhesive tape, etc.
- Available facilities to prevent oil and chemical spills: sand bags, sand cement etc.
- Available means to protect the body in case of risk: poison mask, boots, etc.

Figure 8: Some supporting means for the community⁶²



⁶² Ha My Giang (2018). Available online at <https://news.zing.vn/3-viec-can-lam-ngay-sau-hoa-hoan-post831340.html>. 04/03/2018.; <https://ggs.net.vn/vi/khau-trang-bao-ho-lao-dong>; <http://baohovietnam.com/thiet-bi-bao-ve-duong-ho-hap/ban-mat-na-phong-doc>

PART 4

SYSTEM OF COORDINATION FOR ENVIRONMENTAL ACCIDENT PREVENTION, PREPAREDNESS AND RESPONSE

Figure 9, at the end of this Section, shows the coordination for environmental accident prevention, preparedness and response within a province. The relevant authorities and communities are responsible for their functions and duties, as regulated and under the direction and administration of the PPC in accident response.

4.1. PROVINCIAL POLICE

- Advise the PPC to implement fully and effectively the contents of FPF in the province. Direct the police firefighting force to strengthen the implementation of functions and duties, as prescribed. Check and supervise the implementation of regulations on FPF at establishment, especially industrial production facilities.
- Review establishments at high risk of fire and explosion in the province to enhance inspection using the Law on FPF regulatory compliance.
- Support consultancy on applying FPF solutions, training and mock drills on FPF for establishments. In the implementation of the firefighting plan, it is necessary to consider the possibility of affecting the environment and to prioritize the options that have a lesser impact on the environment and limit the occurrence of environmental accidents.
- Receive information of accident occurrence (through FPF and the Rescue Police Department). Coordinate with local authorities, MBIZ and relevant authorities to develop a specific handling plan for each case.
- Organize the evacuation of all people in the initial isolation area and establish fences and guard stations. Inform people in the affected area of the prevailing wind direction in order to bring about safe solutions or evacuate completely until the problem has been fully overcome.
- Mobilize forces and coordinate with other forces in enterprises and localities for emergency response. Use emergency response facilities and personal protective equipment to handle accidents at the scene.
- In the case of national-level accidents or unexpected situations, it is possible to

coordinate with forces of FPF and rescue police from neighbouring provinces or to report to the Ministry of Public Security with a view to strengthening support forces.

- Organize a field inspection team to investigate the accident's cause and organize a guarding scene.

4.2. PROVINCIAL MILITARY COMMAND (PMC)

- Arrange forces and means to be ready to participate in responding to emergency situations and overcoming the consequences of accidents, ensuring that the army is a key force in overcoming the accidents.
- Mobilize and direct the armed forces in the province to coordinate with the provincial police to directly command protection of the scene, security and order in the accident area.
- Coordinate with other forces to control traffic, protect people's properties in the area and evacuate people to a safe place.
- Coordinate with different sectors to grasp the situation both inside and outside the accident area, in order to take measures that ensure order and security and inform the mass media of the evolution of situation. This will ensure that organizations and individuals are aware of the situation.
- Direct the military force to develop a plan for overcoming chemical accidents, radiation and nuclear accidents for specific situations.

4.3. DEPARTMENT OF INDUSTRY AND TRADE (DOIT)

- Strengthen the state management for chemical activities according to regulations, in particular production, business, storage, preservation, use, extraction, packaging and transport of chemicals in the province.
- Organize propaganda and community awareness-raising on prevention, response and remedy for chemical and toxic chemical accidents.
- Review and make a list of organizations and individuals involved in chemical-related activities that can potentially cause chemical accidents. Guide and request organizations/individuals to develop and implement the plan/measures to prevent chemical accidents, in accordance with the Law on Chemicals, ensuring that forces, equipment and facilities are in place for an on-site response.

- Preside and coordinate with concerned agencies over inspection, settling of complaints and denunciations and handling of violations of chemical activities in target localities, according to the provisions of the law.
- Supervise compliance with conditions for the production and trade of chemicals in industry and chemical safety training of organizations and individuals under management.
- Advise the PPC to issue mechanisms and policies that ensure the legal basis for implementing chemical accident response activities.
- Determine the physical, chemical and other hazardous properties of chemicals to provide information to the FPF and Rescue Police Department in the event of chemical accidents.
- Coordinate with the PMC and DoNRE to contact the Ministry of Industry and Trade (Chemical Department) and the National Committee for Search and Rescue to consult upon hazard issues and solutions in the event of accidents caused by unknown chemicals, or if there is a need for support from central forces.

4.4. DEPARTMENT OF NATURAL RESOURCES AND ENVIRONMENT (DONRE)

- Regularly organize awareness-raising for enterprises to prevent the possibility of on-site environmental accidents.
- Coordinate with departments, sectors (including MBIZ) and localities to inspect and supervise compliance with legal requirements on environmental protection.
- Coordinate with the DoIT to provide field forces with the hazardous properties of chemicals in the event of chemical accidents.
- Advise the PPC to deal with the consequences of environmental accidents.
- Supervise and inspect the working environment and surrounding environment where the accident occurred before resuming operations.
- Lead the development of plans to overcome the long-term effects of environmental accidents and implement environmental monitoring and supervision plans.
- Coordinate with the authorities and communities to conduct damage assessment, waste treatment and environmental monitoring after accidents in the management area. Notify the Head of the Steering Committee once the environment is again safe for people.

4.5. DEPARTMENT OF HEALTH (DOH)

- Coordinate with the DoNRE and local authorities to develop an evacuation and relocation plan for people in dangerous areas in the event of environmental accidents.
- Direct provincial health agencies to support response activities, in particular first aid and treatment for victims affected by environmental accidents.
- Mobilize forces, means and medical equipment to the scene, ready to tend to the injured.
- Direct provincial, district, city and town hospitals to arrange emergency ambulances in the accident area and to be ready to receive victims.
- Coordinate with local authorities to monitor the health of those present in the initial isolation area after overcoming the accident, to ensure the timely detection and treatment of all victims.

4.6. DEPARTMENT OF LABOUR, INVALIDS AND SOCIAL AFFAIRS (DOLISA)

- Coordinate with the relevant agencies, departments and sectors for the correct implementation of propaganda to ensure OSH according to regulations.
- Strictly manage the technical safety inspection and declaration of the use of machines, equipment and materials with strict requirements on working safety. Strictly deal with enterprises violating OSH regulations and FPF, in accordance with the law.
- Participate with the relevant agencies to investigate the causes of working accidents, in accordance with the OSH Law and related documents.

4.7. DEPARTMENT OF INFORMATION AND COMMUNICATION (DOIC), PROVINCIAL RADIO – TELEVISION

- Direct and orient information to press agencies and promote propaganda in the community on the meaning and importance of fire and explosion prevention, environmental accident prevention and response.

- Coordinate with the on-site Steering Committee to provide information to mass media and the general public about response and rescue activities, so that enterprises and people can be aware of the situation and return to normal operation once the safety of the living and working environments has been ensured.

4.8. DEPARTMENT OF TRANSPORT (DOT)

- Propose routes ensuring the load scale and technical requirements to serve the transport of chemicals, petroleum and hazardous wastes and coordinate with the relevant departments and agencies to strengthen the management of transport means.
- Strictly manage the issuance and renewal of registration certificates of inland waterway vessels and inland ports for specialized means of transporting liquids (petrol and oil of all kinds) and related yards for petroleum trading reserves. At the same time, coordinate with the relevant departments and sectors to inspect and handle means of transporting petrol and oil that violate specialized regulations for the prevention of oil spills.
- Coordinate with the relevant departments and sectors to consider regional and provincial transport systems, and guide and handle the orientation of immigration and rescue in the event of an accident.

4.9. DEPARTMENT OF SCIENCE AND TECHNOLOGY (DOST)

- Coordinate with the relevant agencies to grasp the accident-related technical characteristics of technology lines, machinery and equipment to report to the PPC to on handling orientation.
- Develop and implement the radiation and nuclear accident prevention and response plan. Coordinate with organizations and individuals to overcome problems in the event of radiation and nuclear accidents under management according to the regulations.

4.10. DEPARTMENT OF AGRICULTURE AND RURAL DEVELOPMENT (DARD)

- Strengthen propaganda to disseminate the provisions of the law on production, trade and use of fertilizers and pesticides.
- Conduct inspection and assessment of production and trade establishments of fertilizers and pesticides according to regulations.
- Assume the main responsibility for, and coordinate with branches and localities to inspect and review, the compliance with conditions for trading and producing pesticides in the province.
- Advise the PPC and coordinate with other agencies to respond to chemical accidents from agricultural activities and other accidents affecting agricultural production.

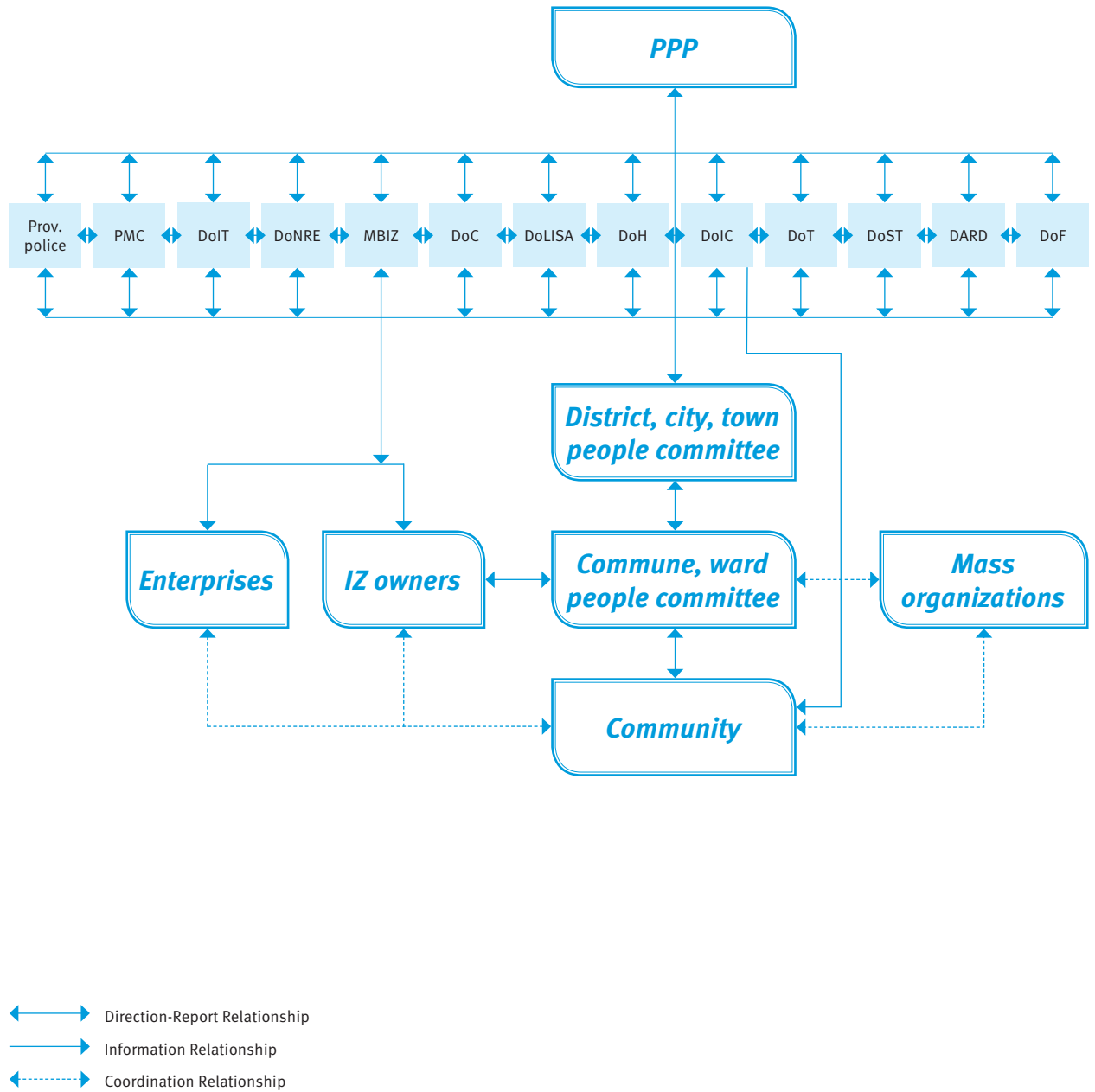
4.11. DEPARTMENT OF CONSTRUCTION (DOC)

- Guide and coordinate with relevant agencies and localities to handle and propose solutions to the works affected by environmental accidents in the province.

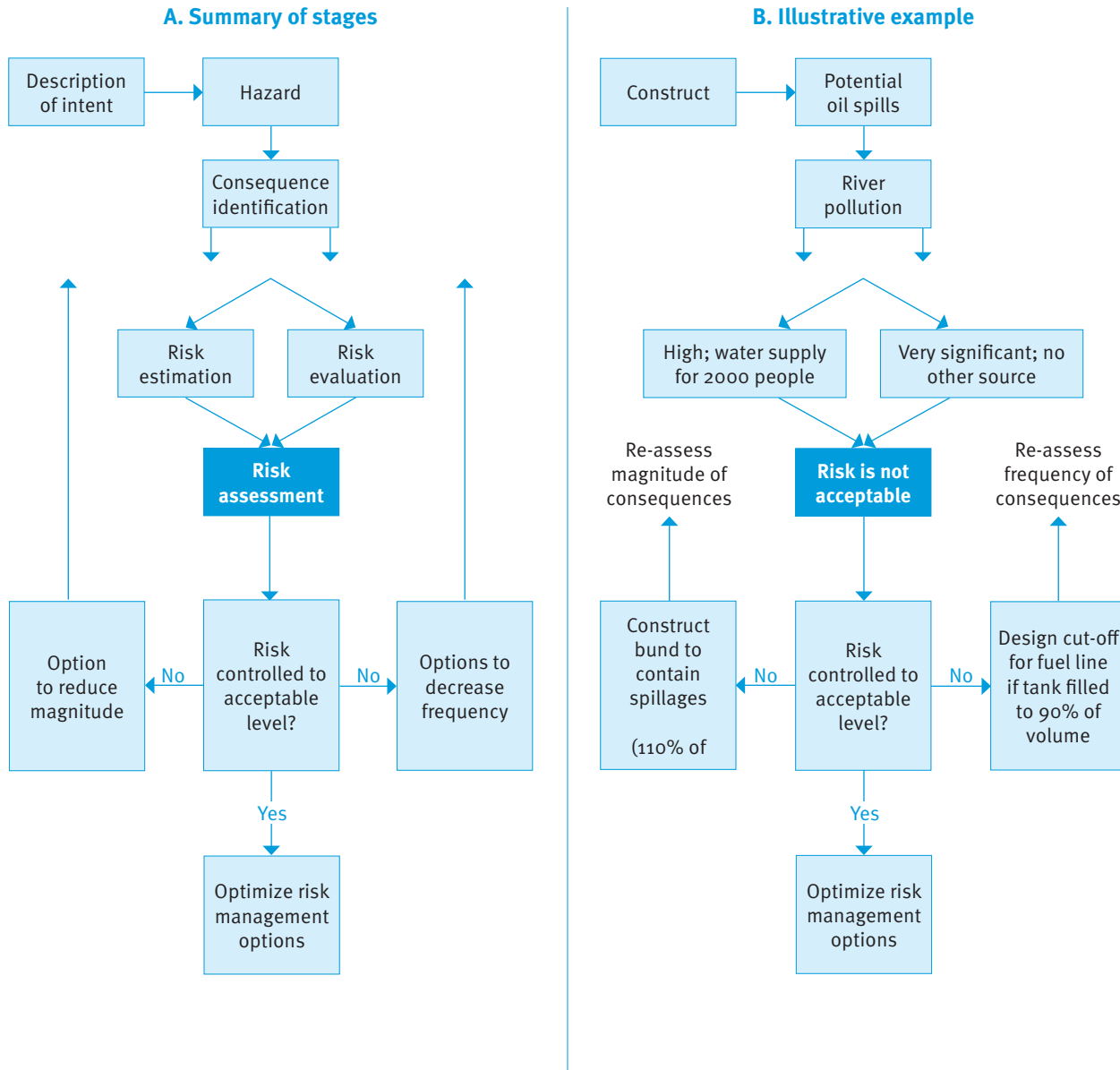
4.12. DEPARTMENT OF FINANCE (DOF)

Coordinate with relevant agencies and advise the PPC to allocate funds to ensure activities for prevention and emergency response to environmental accidents occurring in the province.

Figure 9: Coordination diagram for prevention, preparedness and response to environmental accidents in a province



APPENDIX 1: STAGES IN THE RISK ASSESSMENT PROCESS⁶³



63 World Bank (1997). *Environmental hazard and risk assessment*. Available online at <http://siteresources.worldbank.org/INTSAFEP/OL/1142947-1116493361427/20507357/Update21EnvironmentalHazardAndRiskAssessmentDecember1997.pdf>

APPENDIX 2: SOME EXAMPLES OF RISK ASSESSMENT BY MATRIX METHOD

Appendix 2.1: OSH risk assessment matrix⁶⁴

Objective: To assess OSH risks to regulate necessary control solutions		Consequence (C)			
		0 – No injury, no disease, no violation of the law	1 – Mild injury, mild illness, no violation of the law	2 – Leaving work due to injury but not losing the ability to work, potentially violating the law	3 – Dead or incapable of working, violating the law
Likelihood (L)	0 Does not happen or very rarely happens	0 Insignificant Negligible risk, related to activities that have control procedure	0 Insignificant Negligible risk, related to activities that have control procedure	0 Insignificant Negligible risk, related to activities that have control procedure	0 Insignificant Negligible risk, related to activities that have a control procedure
	1 Occasionally happens	0 Insignificant Negligible risk, related to activities that have a control procedure	1 Acceptable Risks are reduced to acceptable levels	2 Moderate Additional control and improvement measures are required, additional periodical monitoring may be required	3 High Unacceptable but the operation can still be allowed under special supervision
	2 Usually happens	0 Insignificant Negligible risk, related to activities that have a control procedure	2 Moderate Additional control and improvement measures are required, additional periodical monitoring may be required	4 Serious Unacceptable, must stop working	6 Very serious Risks threatening the survival of enterprises and communities

⁶⁴ Project “Building a safe and healthy environment for workers (20 - Safety and health for young workers - SAFEYOUTH @ WORK” (2017).
Training materials on State management of OSH

Appendix 2.2: Environmental risk assessment matrix⁶⁵

Likelihood (T)	Consequence (S)				
	Catastrophic Long-term environmental damage (5 years or longer)	Major Medium-term environmental damage (15 years)	Moderate Short-term environmental damage (less than 1 year)	Minor Environmental damage	Insignificant Negligible environmental impact
Almost certain Once a year or more frequent	Extreme Act immediately	Extreme Act immediately	High Act today	High Act today	Medium Act this week
Likely Once in 1 to 3 years	Extreme Act immediately	Extreme Act immediately	High Act today	Medium Act this week	Low Act this month
Possible Once in 3 to 10 years	Extreme Act immediately	High Act today	Medium Act this week	Medium Act this week	Low Act this month
Unlikely Once in 10 to 50 years	High Act today	Medium Act this week	Medium Act this week	Low Act this month	Low Act this month
Rare Once in 100 years or more	High Act today	Medium Act this week	Low Act this month	Low Act this month	Low Act this month

Appendix 2.3: Risk matrix assessment of threats to water quality⁶⁶

Consequences \ Likelihood	Daily or more often	Weekly or more often	Monthly or more often	Yearly or more often	Once in 10 years	Once in 100 years
Catastrophic EVs compromised	A5	B5	C5	D5	E5	F5
High-level EVs compromised	A4	B4	C4	D4	E4	F4
Moderate EVs compromised	A3	B3	C3	D3	E3	F3
Low-level EVs compromised	A2	B2	C2	D2	E2	F2
Minor consequences	A1	B1	C1	D1	E1	F1
Trivial	A0	B0	C0	D0	E0	F0

Overall risk rating: HIGH MODERATE LOW

⁶⁵ University of New South Wales (1997). *Environmental Risk Rating Procedure*. Available online at <https://www.gs.unsw.edu.au/policy/documents/envriskratingprocedure.pdf>

⁶⁶ EPA, South Australia (2009). *A risk assessment of threats to water quality of in Gulf of St. Vincent*. Available online at www.epa.sa.gov.au/files/8599_risk_gsv.pdf

APPENDIX 3: TEMPLATE OF PREVENTION AND RESPONSE PLAN TO ENVIRONMENTAL ACCIDENTS FOR ENTERPRISES IN IZS

1: Hazard identification

- Identifying possible hazards in production, business and service stages (overflow, spills, leaks, fire and explosions, etc.).
- Determining potential hazards that may cause problems in waste management and treatment activities (wastewater, exhaust gas, solid waste and hazardous waste).

2: Risk assessment

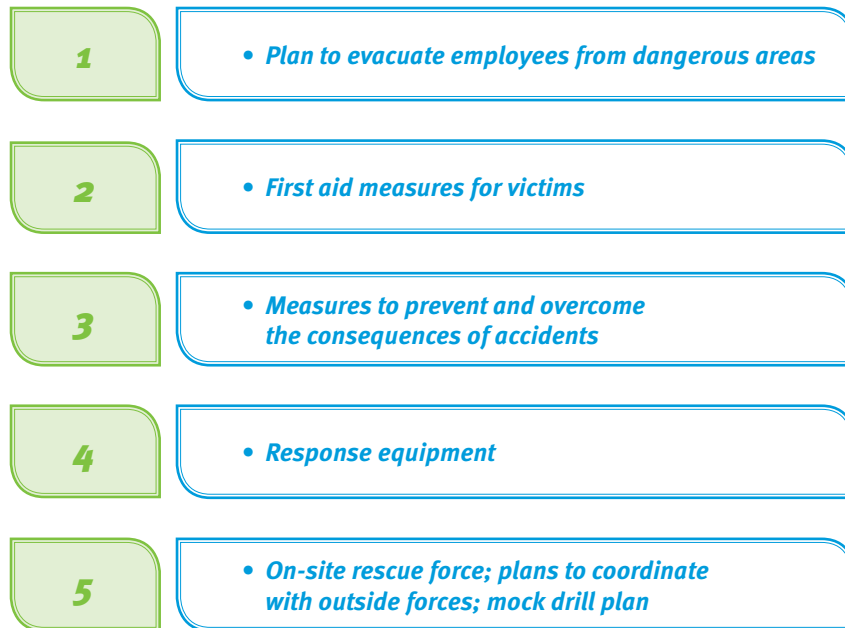
- Predicting the level of risk and possible frequency of each hazard, thereby assessing the risk through the extent of the impact and scope of the hazard.

3: Prevention and preparedness measures

- Proposing preventive technical solutions for each hazard, prioritizing hazards with high risks.
- Plan to ensure that resources (human resources, materials, equipment and finance) of enterprises are ready to respond to and overcome environmental accidents.
- Measures to warn, alert and ensure that security and traffic are ready to respond in the event of environmental accident occurrence at the enterprise.
- Developing a coordination mechanism, which clearly specifies the roles and responsibilities of stakeholders, both inside and outside enterprises, in environmental accident prevention, response and recovery.
- Establishing an on-site emergency rescue team and building operational regulations with clear functions and duties for each team member.
- Developing programmes of education, training, mock drills and disseminating information to employees in enterprises and other stakeholders (such as customers, material providers, waste transporting and handling officials).







4: Emergency procedure

- The response procedure (or On-site Response Plan) should be developed specifically for each type of accident, such as chemical spills or leaks (including petroleum and gas), explosion and fire accidents, spills or breakage of wastewater treatment tanks or waste tanks, failure of the exhaust gas treatment system and storms or high tides causing floods in IZs. The content of the Emergency Response Plan in the workplace includes the following main contents⁶⁷:



⁶⁷ Vietnam National Assembly (2015). *Law on Occupational Safety and Health*. Article 78. Available online at <http://www.molisa.gov.vn/en/Pages/Detail-document.aspx?VID=639>

APPENDIX 4: EMERGENCY PROCEDURE FOR ENVIRONMENTAL ACCIDENTS FOR EMPLOYEES IN ENTERPRISES⁶⁸

EMERGENCY PROCEDURES	
<p>1</p> 	<p>STAY CALM</p> <p>Do not panic. Your behaviour can influence others, so staying calm will help the emergency response.</p>
<p>2</p> 	<p>TAKE COMMAND</p> <p>Call – or delegate someone to call – the emergency services (114) immediately and explain the situation. Assign someone to meet and direct the ambulance to the location.</p>
<p>3</p> 	<p>ASSESS THE SITUATION</p> <p>Use extreme caution when approaching the scene to avoid being injured yourself. Try to determine what has happened and what the emergency is. Try to eliminate or control the cause of the emergency in order to prevent further danger to the injured workers, to others or to the property. Give first aid as soon as possible.</p>
<p>4</p> 	<p>PROVIDE PROTECTION</p> <p>Safeguard the area to protect others from being injured and to prevent further losses. You may be called upon to help divert traffic, suppress a fire, prevent objects from falling or shut down equipment or utilities.</p>
<p>5</p> 	<p>PRESERVE THE SCENE</p> <p>Do not disturb anything except to save a life, relieve suffering or prevent immediate or further losses. Barricade, rope off or post a guard at the scene to make sure that nothing is moved until the authorities have completed their investigation.</p>
<p>6</p> 	<p>FOLLOW PROCEDURES</p> <p>Follow the procedures outlined in your company's emergency response plan. Ensure that senior management is informed. They can contact the correct authorities, notify relatives and begin the procedures for reporting and investigating the accident.</p>

68 ISHA.ca – *Worksafe for life – Construction Health and Safety Manual, Emergency procedure*. Available online at https://www.ihsa.ca/rtf/health_safety_manual/pdfs/legal_responsibilities_emergencies/Emergency_Procedures.pdf

APPENDIX 5: PREVENTION STEPS FOR ENVIRONMENTAL ACCIDENTS DUE TO HAZARDOUS CHEMICAL EMISSIONS⁶⁹

Step 1	<i>Identify hazardous chemicals and locations at risk of accidents.</i>
Step 2	<i>Determine the probability of occurrence of accidents at locations at risk of accidents.</i>
Step 3	<i>Assessment of risks affecting human health and the environment outside the scope of production facilities.</i>
Step 4	<i>Develop the worst scenario.</i>
Step 5	<i>Develop a risk control plan/safety management system at accident risk locations.</i>
Step 6	<i>Identify persons in the emergency response team, establish the functions and duties of the team leader and each participating group.</i>
Step 7	<i>Establish and organize emergency response forces.</i>
Step 8	<i>Prepare equipment for accident response.</i>
Step 9	<i>Prepare information system for accident response activities.</i>
Step 10	<i>Plan to implement the necessary medical measures.</i>
Step 11	<i>Personal protective equipment for employees involved in accident response.</i>
Step 12	<i>Develop the decontamination process.</i>
Step 13	<i>Develop an additional/backup emergency response plan.</i>
Step 14	<i>Develop an awareness-raising and training plan on accident prevention and response issues.</i>

69 Vietnam Environment Administration (2013). *Technical guidance - Preventing, responding to and remedying environmental accidents due to hazardous chemical emissions*

APPENDIX 6:

CHEMICAL SPILL RESPONSE MOCK DRILL

Before the drill

- Before beginning, select a specific chemical substance that will be the subject of your drill. If desired, a spill may be simulated with a small amount of water, sand or another harmless substance.
- A minor chemical spill is one that the employee is capable of handling safely without the assistance of safety or emergency personnel. All other chemical spills are considered major.
- The drill will take around one hour.

Scenario

It is 15 minutes to lunch when a custodian moves a cabinet of cleaning chemicals. The cabinet tips over and the chemicals spill out, releasing dangerous gases into the hallway area.

- Firstly, the Lead Facilitator will assign roles to exercise staff and brief them on the details of the exercise.
- Secondly, the Lead Facilitator will lead and guide the exercise by presenting information. He or she will provide messages to the exercise's participants to ensure that key decision points in the exercise are reached.
- Thirdly, the Lead Facilitator will observe and coach. In this role, he or she will observe the actions of participants and be alert to potential safety issues. If the Lead Facilitator observes a safety concern, he or she may need to intervene and stop the exercise.

Minor chemical spill procedures

- 1: Identify the chemical.
- 2: Alert people in the immediate area of the spill.
- 3: Put on the appropriate personal protective equipment for the chemical.
- 4: If the material is flammable, shut off electrical equipment, pilots, furnaces and the air conditioner, if this can be done without introducing the material further and if it will not cause a spark.
- 5: Ventilation instructions.
- 6: Isolate the spill by using absorbent material (for instance make a dam around the spill). Neutralize the spill or collect the spilled substance using absorbent materials. Place used absorbent materials inside an approved container.
- 7: Call the local poison centre for labelling and disposal information.
- 8: As soon as possible, provide information to each departmental office within the facility

if the spill has the potential to affect persons outside the room in which the spill occurred. Provide sufficient information so that building occupants can be informed of what has happened and whether they need to take any action to protect themselves.

Major chemical spill procedures

- 1: Identify the chemical.
- 2: Actual spill procedure. Call for help and attend to injured or contaminated persons and remove them from exposure if you can do so safely.
- 3: Alert people to evacuate the building/area.
- 4: If the material is flammable, shut off electric equipment, pilots, furnaces and the air conditioner, if this can be done without introducing the material further and if it will not cause a spark.
- 5: Have a person with knowledge of the accident assist emergency personnel.
- 6: As soon as possible, provide information to each departmental office within the facility if the spill has the potential to affect persons outside the room in which the spill occurred. Provide sufficient information so that building occupants can be informed of what has happened and whether they need to take any action to protect themselves.

Group discussions after the drill

How did it go?

- Talk about the positives and negatives in the response emergency plan.
- What went well and why?
- What did not go so well and why?
- Discuss the success of teamwork.
- Which challenges did you experience?

Other challenges

- Identify any barriers that interfere with alerting people who would be affected by the spill.
- Specify any difficulties in selecting and using spill control materials (absorbents, etc.).
- Discuss any obstacles to ventilating the area of the spill.
- Identify any problems related to emergency phone numbers, eyewash stations, emergency showers and first-aid kits.
- List any difficulties in selecting and using the appropriate personal protective equipment.

Lessons learned

- Develop the emergency response plan.
- List any goals for improvement.

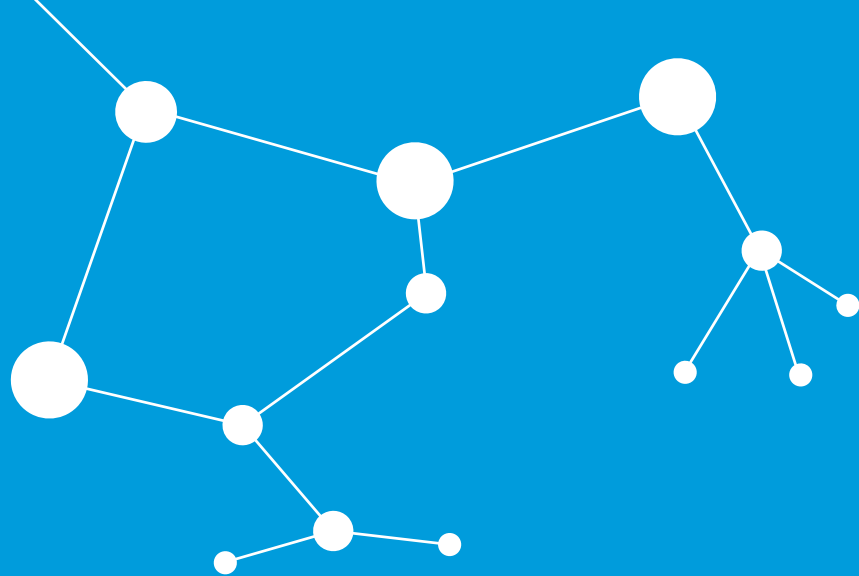
APPENDIX 7:

LIST OF RELATED LEGAL DOCUMENTS

1. Law on Fire Protection and fighting 2001 and 2013.
2. Chemical Law 2007, consolidated in 2018.
3. Viet Nam Labour Code 2012.
4. Law on Natural Disaster Prevention and Control 2013.
5. Environment Protection Law 2014.
6. Occupational Safety and Health Law 2015.
7. Decree no. 95/2013/ND-CP of the Government on penalties of administrative violations in labour, social insurance and overseas manpower supply by contract.
8. Decree no. 66/2014/ND-CP guiding a number of articles of the Law on Natural Disaster Prevention and Control.
9. Decree no. 79/2014/ND-CP detailing the implementation of some articles of the Law on Fire Protection and Fighting 2001 and 2013
10. Decree no. 03/2015/NĐ-CP on environmental damage assessment.
11. Decree no. 39/2016/NĐ-CP detailing a number of articles of the Law on Occupational Safety and Health.
12. Decree no. 44/2016/NĐ-CP detailing some articles of the OSH Law.
13. Decree no. 155/2016/ND-CP on penalties for administrative violations against regulations on environmental protection.
14. Decree no. 30/2017/NĐ-CP on regulation on emergency response to accidents, natural disasters and search and rescue.
15. Decree no. 83/2017/NĐ-CP on regulation on rescue operations by fire departments.
16. Decree no. 113/2017/NĐ-CP detailing and guiding the implementation of a number of articles of the Chemical Law.
17. Decree no. 82/2018/NĐ-CP on management of industrial parks and economic zones.
18. Decision no. 02/2013/QĐ-TTg – Regulation on oil spill response activities.
19. Decision no. 224/QĐ-TTg of the Prime Minister promulgating the Plan of implementing the Master Plan for response, search and rescue to accidents and disasters until 2020.
20. Decision no. 26/2016/QĐ-TTg of the Prime Minister promulgating the

Regulation on operation for toxic chemical accident response.

21. Decision no. 1304/QĐ-TTg of the Prime Minister promulgating the Plan to implement the Government's Decree on the organization and operation for response, search and rescue activities to accidents and disasters.
22. Circular no. 32/2017/TT-BCT specifying and guiding the implementation of a number of articles of the Law on Chemicals and Decree. no.113/2017/ND-CP.
23. Circular no. 08/2018/TT-BCA regulating in detail some articles of Decree no. 83/2017/ND-CP on regulation on rescue operations by fire departments.
24. Circular no. 36/2018/TT-BCA amending and supplementing a number of articles of Circular no. 66/2014/TT-BCA detailing the implementation of a number of articles of Decree no. 79/2014/ND-CP detailing the implementation of a number of articles of the Fire Prevention and Fighting Law and the Law amending and supplementing a number of articles of the Law on Fire Prevention and Fighting.
25. Circular no. 35/2015/TT-BTNMT dated 30 June 2015 providing for the environmental protection of economic zones, industrial parks, export processing zones and hi-tech parks.
26. Circular no. 04/2014/TT-BLĐTBXH – Guiding implementation of regulations on personal protective equipment.
27. Decision no. 11/QĐHN-BQP of the Ministry of Defence promulgating the Regulation on oil spill accident response activities.
28. Viet Nam Building Code on Regional and Urban Planning and Rural Residential Planning QCVN 01: 2008/BXD.
29. TCVN/4449/1987 “Urban construction planning - Design standards”.
30. Official Letter no. 5183/BTNMT-TCMT of the Ministry of Natural Resources and Environment on implementing and supervising the prevention, response and recovery environmental accidents.





UNITED NATIONS
INDUSTRIAL DEVELOPMENT ORGANIZATION

Vienna International Centre • P.O. Box 300 • 1400 Vienna • Austria
Tel.: (+43-1) 26026-0 • E-mail: info@unido.org
www.unido.org

