

CHAPTER 20

Emergency Preparedness and Evacuation

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The first consideration in the event of a fire, explosion or other emergency at a terminal is the safety of personnel. A comprehensive and well exercised emergency and evacuation plan is essential for a terminal to respond to emergencies effectively.

This chapter provides guidance on the preparation of terminal emergency response, evacuation plans and important training and resources.

Detailed information on fire protection in terminals is contained in chapter 19.

20.1 Overview

All terminals should have procedures for immediate action in emergencies. A risk assessment (see chapter 4) should be undertaken to identify the emergencies at the terminal. Procedures and resources should cover all credible scenarios, or situations, identified for the terminal, including oil spillage, gas leak resulting in vapour clouds, fire, explosion and ill or injured persons. The plan should have information for the terminal to help visiting tankers, e.g. the ability to respond to fires on the tanker outboard manifold.

Personnel should be familiar with the emergency procedures, be trained and understand the actions required to respond to an emergency. This includes using alarms, creating a control centre and organising personnel.

Information on the hazards of the products handled at the terminal should be readily available in an emergency. The Safety Data Sheet (SDS) should be available to provide workers and emergency personnel with procedures for handling or working with each particular product. The SDS should include details of physical data (e.g. melting point, boiling point, flashpoint), toxicity, health effects, first aid, reactivity, storage, disposal and the PPE required.

Sufficient manpower is needed to properly respond to an emergency. A study should be made to determine the manpower required for the whole period of any emergency. Assistance may be from local emergency organisations, nearby airports, industrial plants or military installations. However, terminal manpower should be enough to mount a first response.

The most important parts of emergency plans are organisation and resources. The plan only works if these parts are checked during preparation and regularly practised, so that it fully meets the terminal requirements.

When creating the emergency plan, all groups involved should be consulted.

It is important to:

- Analyse credible emergency scenarios.
- Agree on the best way to respond to the scenarios.
- Agree on an organised plan with the necessary resources to complete the plan properly.
- Document training and practice schedules.

20.2 Hierarchy of emergency scenarios

20.2.1 General

The following guidelines are not prescriptive but intended to provide examples that can be customised for a terminal or specific scenario. For terminals that already have emergency plans, these guidelines provide a checklist for comparison.

20.2.2 Hierarchy of emergencies

Before creating a terminal emergency plan, a study should be made of the terminal, available resources checked (both in and outside working hours) and common scenarios reviewed. Based on this study, a risk-based hierarchy of emergencies should be created, e.g.:

- Local emergency.
- Terminal emergency.
- Major emergency.

20.2.3 Local emergency

A local emergency is a low risk to life and property that can be managed by terminal staff. This emergency does not affect operations in other parts of the terminal or in the port.

20.2.4 Terminal emergency

A terminal emergency is one that is more complex or larger. It can impact operations in the whole terminal, may affect more than one tanker and may influence the port.

20.2.5 Major emergency

A major emergency is a very high risk to life and property and the whole terminal as well as the neighbouring port is at great risk.

20.2.6 Escalation

Not every operational incident is as an emergency. However, an incident may change into an emergency, so the plan should describe how to raise the response to a higher level.

20.2.7 Assessing risks

The range of emergencies that a terminal may have to manage may include incidents at the terminal itself and those in the port environment that may threaten, or require major assistance from, the terminal.

Begin with a very wide view of risks and then prioritise them by the possible effect on the terminal operation, together with the chance it may happen. A review of incidents in the recent past can help with this.

20.2.8 Credible emergency scenarios

Incidents that should be covered within the scope of the terminal risk assessment include, but are not limited to:

- Fire or explosion at the terminal and on or around a berthed tanker.
- Release of flammable and/or toxic vapours, gases, oil or chemicals.
- Collisions and allision.
- A tanker breaking away from a jetty, dragging anchor or grounding.
- Major port accidents involving ships, tugs, mooring boats or ferries.
- Meteorological hazards, e.g. floods, hurricanes and electrical storms.
- Terrorist attack or security threat against tankers or the terminal.

20.3 Terminal emergency planning – plan components and procedures

20.3.1 Preparation

In developing a terminal emergency plan, it is important that the functions and stakeholders concerned at the terminal or tanker, e.g. operations, engineering, marine and safety, as well as the wider port area, e.g. port authority, fire brigade, police, Oil Spill Response Organisation (OSRO), and other emergency response providers, are involved. A group may be created, with one person leading communications with all other stakeholders involved.

As staff members and organisations change, the plan should be updated. It is recommended that one staff member is responsible for updating the plan, using a single master copy. Only this member can make changes to the emergency plan.

Everyone with a specific role in the emergency plan should have their own copy of it. Copies should also be available in control rooms. Keep a record of all copies, where they are and each time a change is made. Make written receipts each time a copy is given out.

When digital copies of plans are available to all personnel, e.g. on a local server, the digital version is the controlled copy and printed versions are uncontrolled.

One member should be nominated as room manager for the control centre. They will ensure that the centre has emergency materials and up-to-date documents and will also make sure that it is kept clean and ready for immediate use.

20.3.2 Format

The format of the terminal emergency plan depends on the local situation, the type of plan and its relationship to other documentation.

Personnel who use the plan should be able to read and understand the content. If more than one language version of the plan is used, one version, usually in the local language, should be

designated as the original. If another language is required, and the emergency might involve a tanker, the recommended default language should be English.

- Use flowcharts and diagrams with symbols to reduce written text.
- Digital plans should be:
 - Available to all personnel.
 - Locked with passwords and anti-virus protection.
 - On a computer with an emergency power supply.

All terminals should create an emergency plan that covers all parts of the response in an emergency.

The plan should have:

- Methods to raise the alarm.
- First actions to control the incident.
- Mobilisation and demobilisation procedures.
- Evacuation procedures.
- Assembly points.
- Emergency organisation, including roles and responsibilities.
- Communications systems.
- Media response and public affairs.
- Emergency control centres.
- List and location of emergency equipment.
- Contingency plans.
- Procedure for returning to normal operation.

Each terminal should have an emergency response team with duties including planning, implementing, drilling/exercising and revising emergency procedures as well as executing them.

The main parts for first response to an emergency, e.g. reporting, actions and location of equipment, should be displayed at important locations in the terminal.

Tankers alongside should be advised of the aspects of the terminal's emergency plan that relate to their operations, including alarm signals and escape routes and how the tanker can ask for assistance in an emergency.

The terminal emergency plan should work with:

- Other parts of the company organisation and site facilities.
- Relevant outside organisations, including other companies and public bodies.

Outside organisations that may be involved in an emergency should be familiar with relevant sections of the terminal emergency plan and should participate in joint response exercises.

20.3.3 Control

The terminal emergency plan should identify the personnel who have overall responsibility for managing the emergency response. The responsibilities of other terminal staff should also be detailed.

If there is no control centre, an office should be designated as ready for use in an emergency. The location of the control centre and a list of all personnel assigned to it should be described in the plan. The control centre should be located at a central point that is not next to potentially hazardous areas.

During an emergency, the control centre should have personnel from the terminal, and those from the port authority, fire brigade, tug company, police or other appropriate civil authority. If the emergency involves a tanker, a Responsible Officer may attend the control centre to give advice. A Public Relations Officer should be chosen to relay information to the public, other port users and all involved groups.

During an emergency, it is important that key personnel are easily recognisable, e.g. by wearing different coloured safety helmets or vests. The emergency plan should include these details.

The plan should identify those authorised to declare that an emergency is over. See OCIMF's MTMSA.

20.3.4 Alarms and communications

20.3.4.1 Alarms

All terminals should have an emergency alarm system.

Alarm operation is different for each terminal. For example, a single alarm may be enough for a small terminal, but a large terminal may have a range of alarms for different levels of emergencies. The alarm operation should be described in the marine terminal manual and TIB.

It may be important to also include a silent alarm that secretly notifies a small number of personnel by telephone or radio in case of emergencies such as bomb threats or attacks.

20.3.4.2 Contact lists

The terminal emergency plan should include contact details, both during and outside office hours, for personnel who should be called in case of emergency.

Alternate emergency response staff should be identified in the contact list and they should know their responsibilities and be trained in their duties.

The contact list should be complete and up to date to make sure no other documents, e.g. telephone directories, are needed.

20.3.4.3 Communication system requirements

Reliable communications are essential for managing emergency situations. Backup power supplies should be available in case the primary system fails.

There are three basic parts to the system:

- Terminal emergency alarm.
- Requesting assistance.
- Coordination and control of all emergency activities.

The communications system should be able to cover operations on the jetty, on a tanker, on nearby waters or from other places at the terminal.

Small terminals should at least be able to provide a clear evacuation signal. However, radio and telephone communications are usually the first and best choices of communication.

Larger terminals should have a complete range of communication systems, including Very High Frequency/Ultra High Frequency (VHF/UHF) radio and public address equipment. Incident leadership personnel should have portable radio equipment. A communication centre should be established in the emergency control centre.

If dedicated telephone lines are not used, the emergency communications system should be able to stop other calls using the same line.

The emergency control centre should manage the direction, coordination and control of all emergency activities, including giving advice and information to other port users. For these purposes, it should have a proper communications system linking it with all contacts, both inside and outside the terminal.

20.3.4.4 Communications discipline

The emergency plan should include a set of communication disciplines, which may include code words for different types of emergency. These should also cover the use of personal social media platforms during emergency response. Media response teams should be provided with the equipment to actively monitor all media platforms, including digital and social media, to ensure all reports are effectively managed during the emergency response.

All personnel should understand the need to strictly observe established rules for communication during an emergency and receive training in the use of communications equipment and procedures.

Once mobilised, key staff involved in managing the emergency should limit their communications to that required for emergency response. Communications with the press and media should be managed by the designated media affairs team.

Media organisations play an important role in satisfying the public's demand for information. Managing their demands is challenging with technology, and particularly social media, allowing for instantaneous reporting of events. Handling media interest, particularly in major events when it can extend from local to national and international media organisations, can be a distraction to the incident response team. This will require the situation to be managed effectively to avoid hampering the emergency response.

When an emergency occurs the communications primary objective is to deliver accurate, clear and timely information to the public, to demonstrate that the incident is well managed.

Personnel trained in media response should be designated in the emergency plan. Communications with the media should follow documented media response protocols and be under the control of the central command organisation.

Digital and social media is widely used to provide information to the public. However, it is important to understand that information can be generated by official and unofficial sources, with the latter often being less factual and more speculative than official sources. This will need to be considered when developing a media communication strategy.

A log of events should be kept at the control centre and a record, written or recorded, should be kept of radio and telephone communications.

20.3.5 Site plans and maps

Plans showing firefighting equipment, major terminal facilities and road access should always be updated and available in an emergency, with copies kept in the control centre.

The locations and details of firefighting and emergency equipment on or near a berth should be displayed on the berth.

20.3.6 Access to equipment

All emergency equipment, including fire and lifesaving equipment, should be readily accessible and kept free of obstructions at all times.

20.3.7 Road traffic movement and control

Roadways in the terminal approaches and areas in way of jetty heads should be kept free of obstructions at all times. Vehicles, including any road tankers delivering bunkers (see sections 24.1 and 24.6), should only be parked in designated areas and ignition keys left in the vehicle.

During an emergency, traffic into a terminal or onto berths should be restricted to vehicles and personnel needed for the incident response.

20.3.8 Outside services

The terminal emergency plan should make the best possible use of external services. It is important that external service providers are involved in joint emergency exercises. Combined exercises involving port authorities, tugs, tankers and shore emergency should be conducted at least once a year.

If the terminal is located in an area with other industry activities, consideration should be given to establishing a mutual assistance plan where other groups assist each other in an emergency.

20.3.9 Harbour authorities, vessel traffic control centres, police and fire services

The terminal emergency plan should inform the local harbour authority and vessel traffic control centre, if applicable, of any emergency involving the terminal, or tankers berthed at the terminal, including the details of the:

- Emergency.
- Tankers involved, with locations and cargo details.
- Assistance needed.

This information will let the harbour authority and vessel traffic control centre decide if they should stop navigation within the port area or close the port.

The emergency plan should make sure that any emergency that needs assistance beyond the resources of the terminal is immediately reported to the local fire services or police.

20.3.10 Pilots

If it is decided to partially or totally evacuate jetties, the local pilot organisation may need to be called upon at short notice to provide several pilots to advise on the handling of tankers not directly involved in the incident. The emergency plan should make provision for this eventuality.

20.3.11 Rescue launches

A launch or launches, if available and can be safely deployed, should be included in the plan, to assist with:

- Recovery of personnel in the water.
- Evacuation of personnel trapped on a tanker or on a berth.

Launches for these duties should have the following equipment:

- Communication link that can connect to the control centre's communication system.
- Fixed or portable searchlights for operations during darkness or reduced visibility.
- Thermal blankets.
- Equipment to assist in the recovery of personnel from the water.
- Resuscitation or lifesaving equipment.
- First aid kits.
- Lifejackets for personnel recovered from the water.

The crews of the launches should be trained in rescuing survivors from the water. This should include an awareness of how to handle casualties that may be seriously injured or suffering from extensive burns or hypothermia. Crews should also receive instructions in how to operate breathing assistance equipment including artificial respirators. Launch crews should understand that survival time in the water could be very short and that fast action can save lives.

20.3.12 Medical facilities

Depending on the emergency, it may be necessary to alert medical facilities within and outside the terminal. The emergency plan should include these details.

Medical facilities will need to know:

- The nature and location of the emergency.
- The nature of products involved.
- The expected number of casualties and injuries.
- If medical staff are needed at the location of the emergency.
- Details of the casualties, including names, as soon as these are known.

20.4 Spill response plan

Each terminal should have an approved spill response plan.

At least, the plan should include:

- Name of the plan owner.
- Document control section that identifies plan holders and updates.
- Details including operations, pollutants and a map of the area.
- Roles and responsibilities.
- Identification of the OSRO.
- Spill risk assessment section listing all credible spill scenarios.
- Definitions of tier 1, 2 and 3 spills. The definitions can be a combination of sizes, types of pollutant, repercussions and impacts to assist with spill classification.
- Description of the response plans for the tier 1 response, describing the pollutants.
- Action checklists for members of the spill response teams.
- Health and safety guidance, including SDS.
- Spill size assessment guide.
- Reporting procedures required by the company and authorities.
- Media response and public affairs.
- Contractor management and procurement.
- Notification section, including contact details.
- Inventory of tier 1 clean-up resources.
- Location of tier 2 and tier 3 spill resources.
- References to locations of hydrographic charts and sensitivity maps for the plan.
- A clear understanding of the expectations, that national government or other competent authority may have on the terminal, to respond to spills away from the terminal, e.g. passing traffic) and how far the terminal jurisdiction extends.

20.4.1 Tiered response

Tiered response is a term commonly used in relation to oil spill planning scenarios, oil spill incidents and response in terms of the scale and response capabilities, expertise and resources required.

Tier 1

Oil spill incidents that affect a localised area, being managed using response capabilities, expertise and resources often pre-positioned close by and managed by the terminal.

Tier 2

Oil spill incidents that involve a broader range of impacts and stakeholders. Tier 2 response capabilities, expertise and resources are available regionally and commonly provided by contractors or through mutual agreements between operators and/or other organisations.

Tier 3

Oil spill incidents that have the potential to cause widespread impact, affecting many people and overwhelming the capabilities of local, regional and even national resources. Tier 3 oil spill incidents require the mobilisation of substantial response capabilities (OSRO), expertise and resources, potentially across international borders, and integration into a coordinated response.

International Petroleum Industry Environmental Conservation Association (IPIECA) provide further information including *Report Series Volume 14: Guide to Tiered Preparedness and Response*.

20.4.2 Resource availability

It may be necessary to plan for use of additional outside resources, e.g. materials, equipment and manpower. The plan should include the accessibility and availability of the terminal and outside resources.

The plan should identify those responsible for calling on outside help and provide contact information. Additional resource needed may include:

- Craft for assistance, rescue and evacuation.
- Road transport, including buses and trucks.
- Earthmoving equipment.
- Aircraft for oil spill tracking and surveillance.
- Floodlights for night operation.
- Spill containment, pollution control and clean-up equipment.
- Sand, dispersants, fire hose and foam making equipment, fire extinguishers and additional stocks of firefighting foam concentrate.
- Self-Contained Breathing Apparatus (SCBA).
- Fire suits, helmets and other fire protective clothing.
- Rescue devices, such as hydraulic spreaders and jacks, lifelines, lifebuoys, ladders and stretchers.
- Emergency showers and eyewash stations.
- Medical resources and portable life support systems.
- Food and beverages.
- Human resources, e.g. drivers, electricians, mechanics and general manpower, to ensure material resources are successfully deployed and made operational.

For each resource group, the plan should list:

- Availability, amounts and numbers.
- Main details and performance data.
- Accessibility on a 24 hour basis.
- Addresses of people and location of stores, telephones and radios.
- Delivery time for supply or mobilisation.

20.5 Emergency evacuation and personnel escape routes

The main focus in the event of a fire, explosion or other emergency at a terminal will be the safety of personnel and how they can be safely evacuated.

20.5.1 General

To ensure the effective evacuation of personnel, all terminals should have evacuation facilities and a documented evacuation plan. The plan should be given to visiting tankers and included in the TIB.

The evacuation plan is different for each terminal and depends on the type and location of equipment. This should be checked with a site risk assessment and should include details such as site restrictions, e.g. access, egress and local security measures, weather conditions, e.g. wind direction and sea state, and availability of emergency response and assistance.

20.5.2 T-head jetties and finger piers

Terminal facilities with a shore connection, e.g. T-head jetties and finger piers, have the advantage of potential for evacuation by road transport. Some terminal facilities are designed with oil and gas pipelines supported on the underside of the pier. For this type of facility an evacuation route via water may be needed unless a second escape path via the shore is provided. A fixed means for embarking personnel into tugs, boats and other rescue craft should be provided in the event of the shore route being inaccessible.

20.5.3 Sea islands

From sea islands, the only way to evacuate is by water, although helicopter evacuation may be an option at very large terminal facilities at distant locations. Sea islands should provide fixed means for embarking personnel into tugs, boats and other rescue craft in the event of the shore route being inaccessible. The evacuation of tanker crews should also be considered.

Oil and gas operations do not require large numbers of operating personnel to be involved at marine terminals and it is probable that tanker crews will outnumber terminal personnel. It may also be possible that maintenance personnel will, on occasions, outnumber operational personnel and so the evacuation plan should recognise and cater for this.

20.5.4 Tanker evacuation

There should be an agreement between tankers and terminals in any evacuation plan, and it is important that Masters of all tankers using a terminal are aware of emergency evacuation plans. These agreements should be discussed at the pre-transfer conference and identified when the SSSCL is finished. If it is not involved in the emergency the best way to evacuate may be by the tanker leaving the terminal (see section 20.7).

20.5.5 Non-essential personnel

When an emergency situation may worsen, everyone not involved in safety or firefighting operations should be evacuated.

The decision to evacuate all non-essential personnel should be made early. Early evacuation is safer for personnel and allows the PIC to focus more on emergency response.

20.5.6 Primary and secondary escape routes

Terminal facilities and sea island structures should have emergency muster locations clearly marked and there should be at least two different evacuation routes from all occupied or work areas and from berthed tankers. Escape routes should be located so that, in the event of fire, at least one route provides a safe path, far enough from the source of probable fire to keep personnel safe during evacuation. Evacuation routes and secondary evacuation routes should be clearly marked, and numbered, so that clear instructions can be given to personnel. Evacuation routes should be detailed in the TIB.

If escape routes cannot be kept away from sources of probable fire, the route should be protected, where practicable, by fire walls/barriers or heat shields and should keep personnel safe from exposure to burning hydrocarbons on water, on the topside of loading/unloading facilities or on shore.

Evacuation routes should be designed, and maintained, obstacle free to prevent the need for personnel to jump into water to reach an area of refuge.

Berths and jetties can be difficult to escape from in the event of fire or other emergency. Escape routes should be designed carefully. Access ways to and from offshore berths and dolphins require special attention as people should not be left unattended on isolated dolphins. In addition, steps or steel ladders are usually needed between berths and the water level. On sea islands, access routes and assembly points for rescue craft, or dedicated lifeboats, may require fire walls, enclosures or barriers to provide extended personnel protection.

20.5.7 Availability of rescue craft

When rescue craft may be required for evacuating a terminal they should be kept as close as possible to the evacuation point. The rescue craft and crew should be mobilised early in the emergency and able to be on scene no later than 15 minutes from initial contact. The mobilisation of all available harbour or terminal rescue craft should form part of any emergency plan.

Harbour craft and tugs not under the control of the terminal, but available for use in rescue operations, should be identified in the emergency plan. Early warning should be given for the assembly of all craft used for evacuation, which will then be under the control of the PIC of emergency response.

20.5.8 Survival craft

Remote sea islands may have dedicated emergency evacuation craft, commonly known as survival craft. Survival craft are motor propelled enclosed boats. They are self-righting with fire retardant rigid hulls that are protected by external cooling water sprays. Survival craft have the capability of being launched by remote control within the craft after people have embarked and can protect people when the craft passes through fire on water. The decision to use survival craft at marine terminals should be a local one based on a risk assessment of site specific criteria.

20.5.9 Lifesaving appliances

Every terminal and sea island installation should be equipped with lifesaving appliances for use in evacuation and rescue, such as lifebuoys, Personal Flotation Devices (PFDs) for every

person located at the site and, where appropriate, liferafts or lifeboats. PFDs should be located in prominent and accessible positions.

Lifebuys and liferafts are not suitable for use in evacuation in the case of fire on water, however such lifesaving equipment may be required under local regulations. These devices are typically used for emergency rescue from water in the case of someone going overboard.

20.6 Training for emergencies and emergency exercises

Training should be given for the following emergency activities:

- Firefighting using equipment available at the terminal.
- Transfer of hazardous materials away from the site of the fire.
- Fire isolation.
- Use of PPE.
- Media response and public affairs.
- Coordinated operation with outside bodies.
- Rescue, including training for selected personnel in lifesaving from water.
- Spill containment and clean up.
- Evacuation drills.
- Security threats and terrorist attacks.

The effectiveness of emergency and evacuation plans depends on the training and understanding of personnel.

Emergency and evacuation drills should be held frequently and all key and supervisory personnel at the facility should have a thorough understanding of the emergency and evacuation plans. The plans should be reviewed at least once per year, or after any changes that might affect the response, or findings from routine drills and exercises.

Records should be kept and areas that need improvement or lessons learnt should be recorded and formally followed up.

Individual training records should include details of additional training required after participation in exercises.

20.7 Emergency removal of tanker from berth

When the emergency is on a tanker, the safest course of action, for the tanker, the terminal and the port, is for the tanker to be kept alongside whenever possible. This allows shore based personnel and equipment to be used to support emergency response on board.

If a fire on a tanker or on a berth cannot be controlled, it may be necessary to consider whether it should be removed from the berth. Planning for such an event will require consultation between a port authority representative or Harbour Master, Terminal Representative, Master of the tanker and the senior local authority fire officer. Any consideration of removal of the tanker from berth requires the consent of all interested parties, including local or government authorities, and needs to consider the wider implications to the port.

In the event that an incident escalates, the plan should include the removal of unaffected tankers from adjacent berths.