Government of **Western Australia**
Department of **Mines, Industry Regulation and Safety**

# Petroleum safety and major hazard facility – guide

## Emergency planning

## February 2020

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This publication can be available on request in other formats for people with special needs.

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## Guides

A guide is an explanatory document that provides more information on the requirements of legislation, details good practice and may explain means of compliance with standards prescribed in the legislation. The government, unions or employer groups may issue guidance material.

Compliance with guides is not mandatory. However, guides could have legal standing if it were demonstrated that the guide is the industry norm.

This Guide has an operations focus and is set out in the context of risk assessment and legislative requirements of all responsible persons. Consequently, each operation needs to understand its limitations and skills base.

The Guide is based on current experience and is not claimed to be complete.

## Who should use this Guide?

You should use this Guide if you are responsible for development and implementation of emergency plans for a facility.

# Contents

# 1 Introduction

This document has been developed to provide assistance and guidance to licensees and operators to meet the Western Australian petroleum safety and major hazard facility legislation administered by Department of Mines, Industry Regulation and Safety (the Department).

The legislation covered by this Guide is listed in Appendix 1.

## 1.1 Scope and objective of this Guide

This Guide has been developed to provide licensees and operators with assistance to meet their obligations for effective emergency planning required under Western Australian legislation administered by the Department as listed in Appendix 1, which includes both offshore and onshore facilities, pipelines and major hazard facilities.

For the purpose of this Guide, the term “safety case” is used to cover all of the safety documents referred to in the relevant legislation.

Under the Dangerous Goods Safety (Major Hazard Facility) Regulations 2007, reference is made to a “major incident” whereas petroleum legislation refers to “major accident events” (MAEs). Reference within this Guide is made to MAE which will encompass the term “major incident”.

The objective is to provide clarity to both industry and Department personnel on areas of the legislation which may be ambiguous or open to interpretation.

The following appendices are included:

Appendix 1 Legislative provisions

Appendix 2 References and acknowledgements

Appendix 3 Glossary of terms

Appendix 4 Further information.

## 1.2 Definitions and abbreviations

Definitions and abbreviations are included in Appendix 3 Glossary of terms.

## 1.3 Use of standards

There are a number of standards that can provide guidance and assistance to licensees and operators for completion of their hazard identification and risk assessments that can subsequently feed into the development of the emergency response plan (ERP). Examples are

- AS ISO 31000 *Risk management – Guidelines*
- IEC ISO 31010 *Risk management – Risk assessment techniques*
- ISO 17776 *Petroleum and natural gas industries – Offshore production installations – Major Accident Hazard Management during design of new installations*
- AS/NZS 2885.3 *Pipelines – Gas and liquid petroleum – Part 3: Operation and maintenance*
- AS/NZS 2885.6 *Pipelines – Gas and liquid petroleum – Part 6: Pipeline safety management*
- AS IEC 61882 *Hazard and operability studies (HAZOP studies) – Application guide*
- AS IEC 61511 *Functional safety – Safety instrumented systems for the process industry sector*.

Licensees and operators should reference the current versions of these publications to support the requirements of the safety case and how emergency planning and preparedness needs to be completed effectively within their organisations.

## 1.4 Intent and purpose of emergency planning

A well planned response to an emergency can minimise escalation of an event and prevent or reduce the likelihood of any further injuries or fatalities. Poor emergency planning has contributed to significant loss of life and escalation of events that may otherwise have been avoided.

In 1988, an explosion and resultant fire destroyed the Piper Alpha hydrocarbon production platform, resulting in 167 fatalities. One of the findings of the inquiry into the Piper Alpha disaster by the Hon. Lord Cullen (1990) was that, 'the offshore installation managers on the Claymore and Tartan were ill-prepared for an emergency on another platform with which their own platform was connected' (Cullen, November 1990). The lack of emergency planning was a major factor to both facilities fuelling a pool fire on the Piper Alpha by failing to shut down their interconnected oil production lines in a timely manner.

It is essential that licensees and operators plan for all types of emergencies that could occur on their facilities to ensure their response both prevents and minimises injuries and fatalities.

# 2 Emergency planning within a safety case

Emergency response planning is covered within the safety case, or other relevant safety management document, and includes specific items to be addressed in the safety case.

Licensees and operators need to detail general emergency planning procedures and processes that are in place on their facilities which provide for:

- continual and systematic assessment of risk during emergency situations
- risk reduction to a level that is ALARP for risks arising during evacuation, escape and rescue in case of emergency.

The relationship between specific contents listed in the regulations and the general emergency safety case requirements are shown in Figure 1.

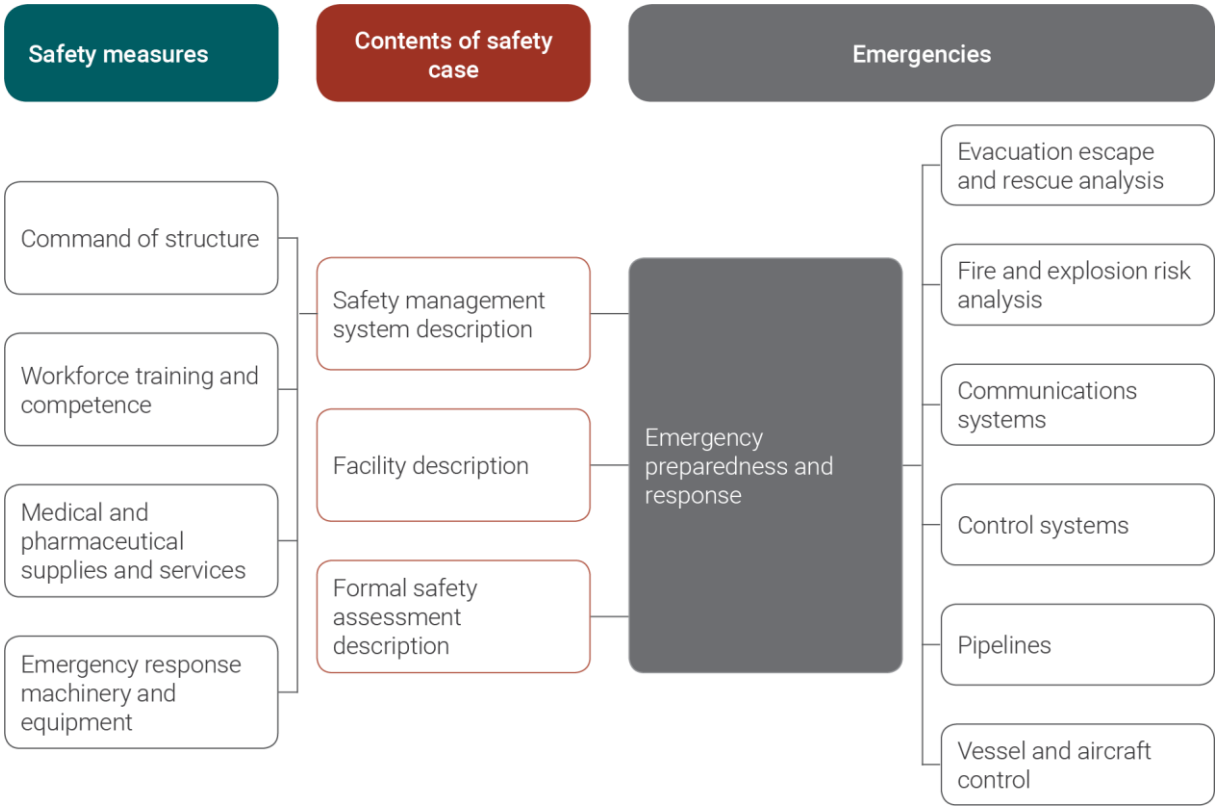


*Figure 1 Emergency planning safety case relationship model*

# 3 Safety measures

Key safety measure areas that must be addressed in relation to emergency response are:

- command structure during an emergency
- training and competence of members of the workforce
- medical and pharmaceutical supplies and services
- emergency response machinery and equipment.

## 3.1 Command structure

It is critical that the emergency response command structure is understood by all members of the workforce and members of the emergency response team. This can be achieved by providing well defined roles, responsibilities and a chain of command.

Command structures for a facility, which may include both offshore and onshore response teams must be described in the safety case. Referencing the emergency response plan is insufficient. The safety case must specify an office or position at the facility, the holder of which is responsible for implementing and supervising procedures and the command structure that applies in the event of an emergency at the facility.

An organisation chart can clearly depict the decision-making hierarchy. The command structure must clearly identify the individual who has overall responsibility for implementing and supervising the emergency response procedures.

This information must also be available at all times to all members of the workforce at the facility or involved in the operations.

A typical emergency response team (ERT) may include:

- Emergency commander
- Deputy emergency commander
- Emergency response team leader
- Emergency response team members
- Communications officer (e.g. radio operator)
- Muster checker and coordinator
- Control room operator

Other personnel may be included in the ERT as and when required who have expertise in specific incident response types.

The ERT should also interact with external emergency services who should be informed of the types of activity taking place on the facility as well as details of hydrocarbons, chemicals or other toxic substances on site.

## 3.2 Training and competence

Licensees and operators must provide a description of the means by which members of the workforce have the required skills, training and knowledge to undertake tasks involving emergency response.

The training system must demonstrate that all reasonable and practicable steps have been taken to ensure members of the workforce will be competent in performing their assigned duties in an emergency.

All members of the workforce required to be part of the ERT should be assessed to verify they meet the required level of competency for particular skills and abilities. This may include knowledge of equipment or machinery, procedures, and supervisory and communication skills. Once this identification process has been completed, a training schedule should be designed.

After training, members of the workforce need to undertake practical exercises to demonstrate their competency. There should be a written report and where necessary, corrective actions generated from

these exercises. This report should identify additional training or changes to processes or procedures that may improve the competency of the members of the workforce.

Any actions should be completed within a reasonable timeframe and assessed to ensure changes have been implemented correctly and training and competency levels have been improved.

Whilst it is important that individual members of the ERT are trained and competent, it is also critical that an ERT's competency is assessed as a whole. Teams should be trained and tested as a unit. This can be demonstrated by completing emergency response drills, role playing exercises and simulations. Review and feedback with the ERT after exercises is essential.

Because emergency situations are non-routine in nature, the skills and capabilities to deal with these types of events can decline without regular practice. The safety case needs to include details of how the licensee or operator intends to ensure competency is maintained over time. Details of regular refresher training and assessment of competency through the use of emergency drills and exercises that involve role play as well as theoretical desktop exercises should be summarised in the safety case.

This training and competency requirement should also include managers and decision makers who may be outside the normal ERT structure but should be fully aware of emergency response requirements and should participate in drills and exercises to ensure their knowledge remains current.

## 3.3 Medical and pharmaceutical supplies and services

The safety case must contain a description of the medical and pharmaceutical supplies available and maintained on a facility for an emergency situation. This should include location, quantity and storage arrangements and demonstrate the supplies are sufficient for emergency situations.

The description also needs to include details of medical services available, whether included within the facility or within a reasonable distance from the facility. For example, offshore facilities would be expected to have a medical centre and associated equipment available on site. Onshore facilities may be in close proximity to public hospitals or ambulances which can provide any emergency services exceeding first aid requirements. The safety case should identify which services would be available, their location and response time to the facility.

## 3.4 Emergency response machinery and equipment

Emergency response equipment should be clearly identified within the safety case and as safety critical elements for the control of MAEs and be subject to regular inspection and testing.

Licensees and operators need to provide an adequate description of an assurance process in the safety case for emergency response equipment, where it is located, the inspection regime and any process in place to ensure it is fit for its intended purpose in an emergency response. This information includes reliance on external support such as the fire brigade, and medical and pharmaceutical supplies and services.

# 4 Emergencies

The following sections cover emergency response requirements that should be summarised within the safety case.

## 4.1 Fire and explosion risk analysis

The formal safety assessment (FSA) of a safety case must contain a detailed description of the fire and explosion risk analysis (FERA) conducted on the facility.

The description of a fire and explosion risk analysis in a safety case for a facility should:

- identify the types of fires and explosions that could occur at the facility
- consider a range of measures for detecting those fires and explosions in the event that they do occur
- consider a range of measures for eliminating those potential fires and explosions, or for otherwise reducing the risk arising from fires and explosions
- consider the incorporation into the facility of both automatic and manual systems for the detection, control and extinguishment of:
  - outbreaks of fire
  - leaks or escapes of petroleum
- consider a range of means of isolating and safely storing hazardous substances used or kept at the facility, such as fuel, explosives and chemicals
- consider the evacuation, escape and rescue analysis, as it relates to fires and explosions
- identify, as a result of the above considerations, the technical and other control measures necessary to reduce the risks associated with fires and explosions to a level that is ALARP.

It is not expected that the full FERA document will be included in the formal safety assessment. When summarising the findings of the FERA, the document title, version and document number should be quoted as a reference.

Results of the FERA should also be an input into the evacuation, escape and rescue analysis (EERA).

### 4.1.1 Types of fire and explosion

The FERA will typically focus on hydrocarbon related fires, but other types of fire that have the potential to escalate into an MAE should also be addressed. As the type of fires expected on a facility can vary according to several parameters, a risk assessment process is required to enable a comprehensive and systematic assessment to be undertaken which prioritises those events that could cause a MAE. Examples of the types that may be encountered are shown in table 1.

*Table 1 Types of fire and explosion*

| | Fires | Explosions |
|---|---|---|
| Process hydrocarbon | • blowouts<br>• jet fires<br>• two phase fires<br>• pool fires<br>• flash fires<br>• cargo tank fires<br>• sea fires<br>• loading/offloading | • ignited blowouts (e.g. moonpool)<br>• confined explosions<br>• semi-confined explosions<br>• unconfined explosions<br>• atomised sprays/mists |

| | Fires | Explosions |
|---|---|---|
| Non process hydrocarbon | • engine room/machinery room/pump room/ workshops/store rooms<br>• lube oil<br>• diesel/fuel oil<br>• paints<br>• heli-fuel<br>• bottled gas<br>• solvents | |
| Non hydrocarbon | • accommodation/laundry/kitchen<br>• electrical equipment (e.g. circuit boards, switchgear room)<br>• inhibitors<br>• cables<br>• cellulosic<br>• explosives<br>• batteries<br>• chemicals | |

The risk assessment and consideration of control measures have been covered in other guides that form part of this suite of documents, namely *Hazard identification, Risk assessment and management including operational risk assessment* and *Major accident events, control measures and performance standards.* Licensees and operators should refer to these for further information if required.

### 4.1.2 Control measures

There are precursors to fire and explosion ignition that can be identified and should be considered in the FERA. These include:

- leakage of combustible fluids or chemicals
- ignition sources
- accumulations of combustible/explosive fluids.

Detection methods associated with these precursors include:

- leak prevention via equipment integrity (welded joints, corrosion monitoring, selection of appropriate materials)
- leak detection
- ignition control (management of open flames, hot surface and rotating equipment, welding, cutting, sparks)
- gas detection
- heating, ventilation and air conditioning
- likely gas dispersion patterns
- procedural controls – e.g. trained staff.

Mitigation and reduction methods must also be considered within the FERA and may include:

- isolation/emergency shutdown systems in place once leak detected
- blowdown/pressure relief
- fire pumps/deluge systems
- process alarms to alert personnel of the fire/explosion

- automatic or manual systems for isolation and shutdown of equipment

Control measures should be considered for their suitability to control an event and any limitations should be recognised such that other control measures can be considered.

Control measures identified in the FERA as being controls for MAEs should be described in the formal safety assessment within the safety case. The physical detail of these controls should be included in the facility description section covering control systems in place or in the SMS description in the safety case. For MAE controls, the SMS must specify the performance standards that apply.

## 4.2 Evacuation, escape and rescue analysis (EERA)

The evacuation, escape and rescue analysis should also be summarised in the formal safety assessment of the safety case.

The content and level of detail needs to be sufficient to enable the Department to assess the scope and process for undertaking the EERA including source data and rationale for excluding or discounting items from consideration. It is not expected that the full EERA document will be included. The document title, version and document number should be quoted as a reference when summarising the findings.

Control measures identified in the EERA must be clearly described in the facility description and the safety management system of the safety case.

The EERA must identify:

- types of emergencies that may take place on a facility
- evacuation routes, and alternate routes available if the primary route is not freely passable
- procedures and equipment available
- estimated facility evacuation time
- any temporary refuge that may be available on the facility and a means of emergency communication in that refuge
- any lifesaving equipment available.

The risk assessment and consideration of control measures have been covered in other guides that form part of this suite of documents, namely *Hazard identification, Risk assessment and management including operational risk assessment* and *Major accident events, control measures and performance standards.* Licensees and operators should refer to these for further information if required.

## 4.3 Emergency communications systems

Communication between all parties is critical in an emergency. Communication systems must be adequate for communicating between all parties involved in the emergency response.

Licensees and operators need to have available a communications system that:

- has sufficient means of communication that allow for successful emergency response
- is capable of handling all MAE and non-MAE emergency scenarios that are likely to occur
- is adequately protected against the MAEs identified in the formal safety assessment.

Prior to determining a suitable means of communication during emergencies, licensees and operators need to consider:

- what information needs to be shared during an emergency
- who needs the information and why.

There are various techniques available that can be used to analyse an emergency response communication structure which will depend on the complexity of the facility or operation. Figure 2 is an example of a technique that could be employed to identify the requirements.

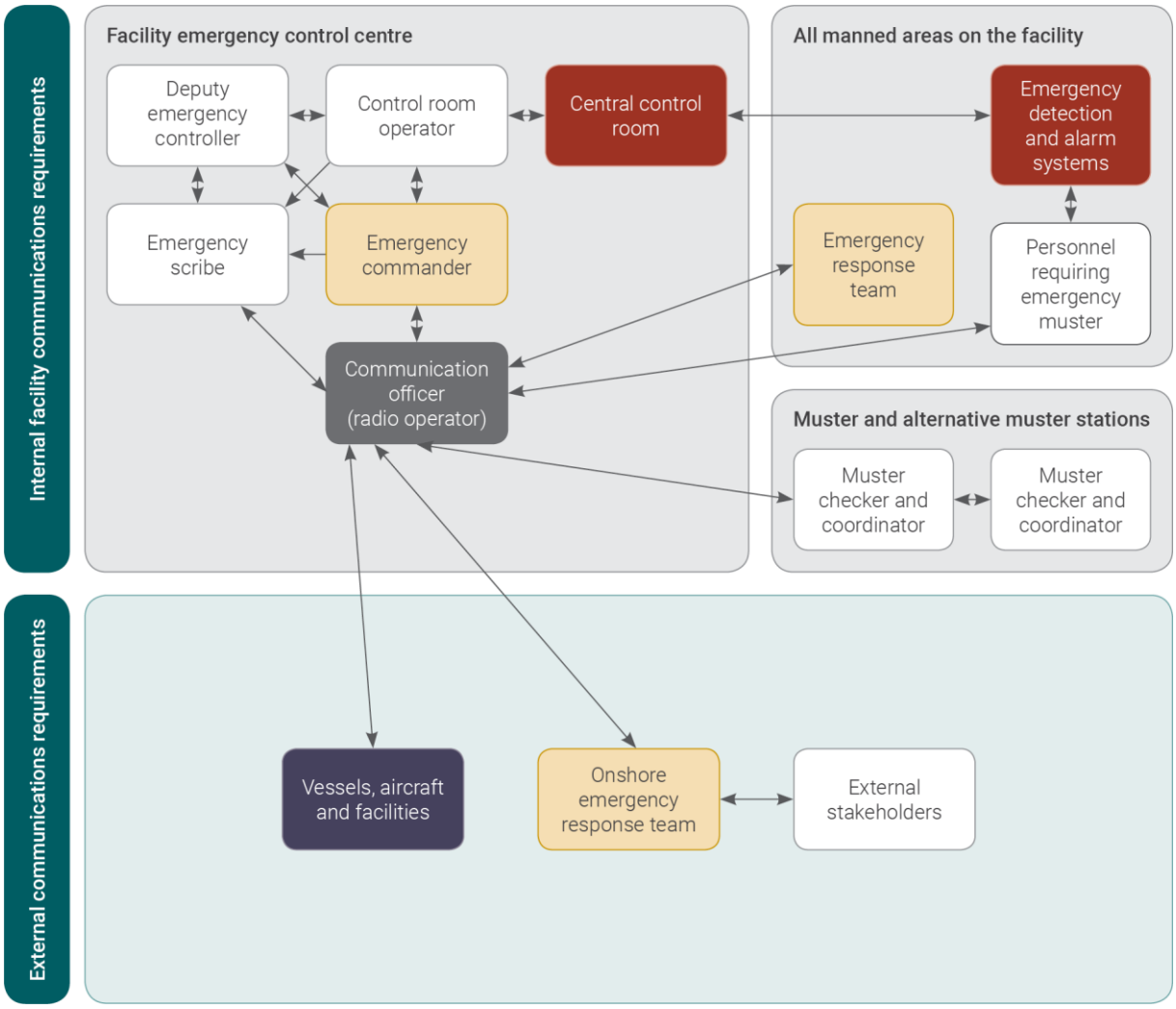


*Figure 2 Facility emergency response communication network*

## 4.4 Control systems

The control systems available should be summarised in the facility description of the safety case. These descriptions should demonstrate that they are adequate to meet the requirements in the event of an emergency.

### 4.4.1 Back-up power supply

Describe in the facility description of a safety case how the licensee or operator will provide adequate security of electrical power supply to the emergency control systems.

The description should cover the emergency power supply system including batteries and generators and should also be aligned with the controls identified in the formal safety assessment.

### 4.4.2 Lighting

Emergency lighting is essential.

The EERA and FERA should address emergency lighting systems. These analyses should consider a range of emergency lighting goals including:

- ability to enable personnel to easily identify escape routes
- provision of adequate illumination to enable effective travel along the escape routes
- provision of adequate illumination of relevant equipment that may be required to be used in an emergency. This equipment may include emergency escape breathing devices, manual shutdowns, fire hoses, smoke hoods and eyewash stations

- provision of adequate illumination for the emergency response team to effectively function in their assigned roles, for example, adequate lighting within the area(s) from which emergency response is coordinated
- provision of safe illumination during all emergency types that could occur on the facility, for example capable of safe operation in a hydrocarbon gas filled environment if located external to the accommodation on any facility working in proximity to hydrocarbons.

The facility description of the safety case needs to contain a description of the lighting systems chosen and include sufficient detail to demonstrate adequacy, which may include the system's key performance standards such as the ability to independently function on loss of power.

### 4.4.3 Alarm systems

An emergency alarm is any alarm that indicates immediate danger to personnel.

Selection of alarm systems will depend on the size and complexity of the facility and if it is offshore or onshore.

Detection systems are an essential part of any alarm system and may be either manual or automatic. Manual detection relies on observation by personnel and uses suitably located communications equipment and systems that provide for the ability to raise the alarm. Automatic detection systems are independent of any human interaction. These detection systems should be described in the facility description of the safety case as part of an overall alarm system.

The alarm system should be capable of providing adequate data that meets the needs of the emergency response team, such as type of alarm, location and its significance. Some characteristics that should be considered in the establishment of a good control centre alarm system are that it is:

- relevant – not spurious or of low operational value
- unique – not duplicating another alarm
- timely – not long before any response is needed or too late to do anything
- prioritised – indicating the importance the problem is dealt with
- understandable – having a message which is clear and easy to understand
- diagnostic – identifying the problem that has occurred
- advisory – indicative of action to be taken
- focussing – drawing attention to the most important issues.

### 4.4.4 Ballast systems

A description of a ballast control system in the facility description of the safety case is necessary where ballasting is a control measure to reduce risk for buoyancy or stability of floating facilities.

Further details of this requirement for offshore facilities can be found in the NOPSEMA *Emergency planning guidance note* GN1053.

### 4.4.5 Emergency shutdown systems (including blowdown)

The facility description of the safety case must include a description of the emergency shutdown systems, including blowdowns. The description should be aligned with the controls identified in the formal safety assessment to reduce risk to ALARP.

Further details of this requirement for offshore facilities can be found in the NOPSEMA *Emergency planning guidance note* GN1053.

## 4.5 Pipelines

Licensees and operators must be able to prevent large inventories of hydrocarbons entering a facility from pipes during an emergency. All offshore hydrocarbon production facilities and onshore facilities including pipelines licensed under the *Petroleum Pipelines Act 1969*, must comply with this requirement.

The most effective means of controlling and mitigating the escalation of a hydrocarbon loss of containment in an emergency is to shut down and isolate the source of the hydrocarbons. The facility description of a safety case must specify adequate procedures for shutting down or isolating a pipe's inventories in order to stop flow into a facility.

The facility description of a safety case should:

- provide a detailed description of the pipe shutdown arrangements, including descriptions of the shutdown equipment, automatic and manual operation functions and locations of the control systems
- include a failsafe isolation device which is capable of isolation if other safety devices fail, for example a subsurface isolation valve that closes on loss of topside communication (without dependency on any other system) may provide suitable fail-safe isolation of a well if the primary shutdown devices on a well tree were rendered inoperable
- recognise the criticality of hydrocarbon inventory isolation and therefore have a specific requirement to specify what maintenance and inspection will be completed to ensure the pipe shutdown systems will function in an emergency.

The formal safety assessment of a safety case should identify the risks with any pipe or pipes being connected to a facility and have identified the required mitigation control measures to reduce the risk to health and safety to ALARP.

## 4.6 Vessel and aircraft control

For offshore facilities it is important to have a system in place to effectively manage operations that involve vessels and aircraft to ensure safety at and near the facility. This system needs to be described sufficiently for both routine operations and emergency response situations.

Further details of this requirement for offshore facilities can be found in the NOPSEMA *Emergency planning guidance note* GN1053.

# 5 Emergency response plan (ERP)

## 5.1 Description of the ERP

The licensee or operator must prepare an ERP which documents the organisation and arrangements in place for dealing with an emergency on the facility.

The ERP needs to cover all stages of an emergency response from detection through to completion when workers are considered to be in a place of safety. Licensees and operators must ensure they are capable of dealing with all types of likely emergencies identified in the formal safety assessment of the safety case. Creating a good ERP requires:

- providing for all potential stages of emergency response including:
  - detection
  - alarms
  - muster points
  - assessment and response
  - evacuation and escape
  - rescue and recovery
  - place of safety
- having a defined command structure detailing key personnel, roles and responsibilities and organisation structure
- establishing clear reliable methods of communications
- aligning with and capable of addressing all MAEs identified within the formal safety assessment
- considering the findings of the FERA
- considering the findings of the EERA
- integrating of the emergency response supplies, services and equipment into the plan where appropriate, including medical provisions
- considering all external parties that may have a role in the emergency response
- providing contingencies planning, which may include the unavailability of personnel with critical roles
- considering the location in which the facility will operate and its effect on the ERP
- providing clear and concise instructions
- providing for continuous improvement using audits or lessons learnt from drills, exercises and incidents.

The safety case should only contain a description of the ERP and any associated procedures not a copy of the complete ERP document. Reference the ERP, version and the document number.

Licensees and operators must demonstrate that their ERP can be executed according to its commitments. This can be achieved by reference to usable and readily available procedures and processes.

The ERP procedures and processes should provide assistance to personnel to perform reliably and effectively and assist in reducing the likelihood of human error in implementing the ERP. Consider:

- identification of actions required for each emergency type
- step-by-step prompts or checklists
- provision of decision-making flow charts
- emergency specific standardised announcement transcripts
- documentation and implementation tools readily available in suitable locations.

While preparing emergency procedures, consider:

- the structure of the document
- the target audience for each section
- how they are controlled and distributed
- how they are maintained and updated.

The safety management system of the safety case should include an overview of the key procedures and processes supporting the ERP and list within the relevant section of the safety management system.

## 5.2 ALARP and performance standards

During development of the ERP, licensees and operators should consider if the ERP meets the principles of ALARP and identify the performance standards that apply. These standards should already be available for all technical and other controls that the ERP relies on (refer to *Major accident events, control measures and performance standards*). For example, communications, competency, fire and gas detection, firefighting systems and evacuation and rescue equipment.

Performance standards are also required for the ERP itself. When identifying the performance standards that should apply, licensees and operators should take into account all the steps in the ERP.

The critical requirements on the relevant facility need to be met and each performance standard should be independently reviewed. The ERP document itself must specify the performance standards that apply. The description in the safety case should include an overview of the performance standards rather than including each standard.

## 5.3 Drills and exercises

Undertaking drills and exercises is a critical part of emergency planning. The drills and exercises should be based on possible emergency response scenarios which have been identified in the formal safety assessment and conducted at the facility.

The safety management system of the safety case should describe the system in place to ensure the completion of drills and exercises, how these will be scheduled and the reporting at the completion of each exercise. It may also be beneficial to include observers in the drill or exercise that are independent to the facility but have the knowledge and experience to provide appropriate feedback after the drill.

The following areas could be included in the drills and exercises:

- frequency of drills and exercises (these can be scheduled on a critical pathway where the higher the consequence of an event the more frequently it should be included in drills and exercises)
- provision for all possible scenarios that could arise on the facility should be included in the schedule
- testing for redundancies, for example multiple failures
- testing of emergency communications and alarm systems
- incorporation and testing of emergency response equipment
- testing emergency response procedures and processes
- testing alternative (backup) response measures
- testing the decision-making framework
- testing individual and team performance
- realistic and unannounced exercises at various times
- measure and evaluation of emergency response plan execution against performance standards
- interaction with external emergency services
- interaction with other stakeholders.

The description in the safety case should also include drill reviews, reporting on any issues identified and allow for feedback and improvement.

These drills and exercises are also an important area of ongoing training and competency assessment for the workforce which can:

- provide ongoing assurance that persons are competent in their roles and in relation to tasks that may be given to them for various types of emergency
- refresh and enhance personnel ERP knowledge and skills, including preparedness and confidence
- identify gaps in knowledge and skills of individuals that need to be rectified
- assist in identifying any training system deficiencies.

Feedback of the results of the drills and exercises to the general workforce enables the licensee or operator to meet the regulatory requirements of workforce involvement.

## 5.4 Mobile facilities

Mobile offshore petroleum facilities include:

- floating production, storage and offloading (FPSOs)
- floating storage and offloading (FSOs)
- mobile offshore drilling unit (MODU)
- accommodation vessels
- pipelay and construction vessels that could be working independently or related to and alongside or adjacent another facility.

The safety case must describe the systems in place for shutdown and disconnection in the event of an emergency which should be aligned with the formal safety assessment and associated control measures and performance standards.

Further details of this requirement for offshore facilities can be found in the NOPSEMA *Emergency planning guidance note* GN1053.

# Appendix 1 Legislative provisions

**Petroleum (Submerged Lands) (Management of Safety of Offshore Facilities) Regulations 2007**

| | |
|---|---|
| r. 31 | Emergency preparedness |

**Petroleum (Submerged Lands) (Pipelines) Regulations 2007**

| | |
|---|---|
| r. 29 | Description of pipeline management system |

**Petroleum (Submerged Lands) (Diving Safety) Regulations 2007**

| | |
|---|---|
| r. 16(1)(j) | Contents of DSMS |

**Petroleum and Geothermal Energy Resources (Management of Safety) Regulations 2010**

| | |
|---|---|
| r. 25 | Emergency preparedness and response plan |

**Petroleum Pipelines (Management of Safety of Pipeline Operations) Regulations 2010**

| | |
|---|---|
| r. 24 | Emergency preparedness and response plan |

**Dangerous Goods Safety (Major Hazard Facilities) Regulations 2007**

| | |
|---|---|
| r. 24 | Safety management system, operator of major hazard facility to prepare |
| Schedule 4 | Procedures to be included in safety management system |

# Appendix 2 References and acknowledgements

Development of this Guide has used:

- NOPSEMA suite of guidance notes
- AS ISO 31000 *Risk management – Guidelines*
- IEC ISO 31010 *Risk management – Risk assessment techniques*
- ISO 17776 *Petroleum and natural gas Industries – Offshore production installations – Major accident hazard management during design of new installations*
- AS/NZS 2885.3 *Pipelines – Gas and liquid petroleum – Part 3: Operation and maintenance*
- AS/NZS 2885.6 *Pipelines – Gas and liquid petroleum – Part 6: Pipeline safety management*
- AS IEC 61882 *Hazard and operability studies (HAZOP studies) – Application guide*
- AS IEC 61511 *Functional safety – Safety instrumented systems for the process industry sector*

# Appendix 3 Glossary

**ALARP**. As low as reasonably practicable.

**EERA**. Evacuation escape and rescue analysis.

**ERP**. Emergency response plan.

**ERT**. Emergency response team.

**Facility**. The term facility has been adopted throughout this document to cover offshore and onshore facilities and pipelines including aboveground structures associated with onshore pipelines.

**FERA**. Fire and explosion risk analysis.

**FPSO**. Floating production, storage and offloading.

**FSA**. Formal safety assessment.

**FSO**. Floating storage and offloading.

**HAZOP**. Hazard operability study.

**MAE**. Major accident event – an event connected with a facility, including a natural event, having the potential to cause multiple fatalities of persons at or near the facility (or as defined within the relevant legislation pertaining to a facility).

**Major incident**. An incident involving or affecting a Schedule 1 substance (Dangerous Goods Safety (Major Hazard Facilities) Regulations 2007) that causes serious harm to people, property or the environment. For the purposes of this document referred to as an MAE.

**MHF**. Major hazard facility.

**MODU**. Mobile offshore drilling unit.

**Performance standard**. A standard established by the operator defining the performance required for a safety critical element typically defining the functionality, availability, reliability, survivability and interdependency of the safety critical element.

**Safety Case**. In this document covers all safety management systems, plans and other safety related documents referred to in WA legislation.

**Safety critical element**. Any item of equipment, system, process, procedure or other control measure the failure of which can contribute to an MAE.

**Serious harm**. Significant incident associated with substances listed in Schedule 1 of Dangerous Goods legislation.

**SIMOPS**. Simultaneous operations.

**SMS**. Safety management system.

**SPAE**. Significant pipeline accident event – an event that:

a) is connected (whether immediately or after delay) with work carried out on, or in relation to, a pipeline

b) causes, or creates a significant risk of causing, human death (for example, because of hydrocarbon releases).

# Appendix 4 Further information

Other guides available:

- *ALARP demonstration*
- *Audits, review and continual improvement*
- *Bridging documents and simultaneous operations (SIMOPS)*
- *Diving safety management system*
- *Hazard identification*
- *Involvement of members of the workforce*
- *Major accident events, control measures and performance standards*
- *Management of change*
- *Offshore facility safety case*
- *Pipeline management plan*
- *Pipeline operation safety case*
- *Records management including document control*
- *Reporting of accidents, incidents and dangerous occurrences*
- *Risk assessment and management including operational risk assessment*
- *Safety management system*