Emergency Planning

Core concepts

- The operator of an offshore facility must, when conducting the formal safety assessments including the fire and explosion analysis and evacuation, escape and rescue analysis, identify the types of emergency that could arise at the facility.
- The safety case must specify a command structure in the event of an emergency, including deputising arrangements.
- The operator must provide a competency system that ensures all personnel have the necessary skills, training and ability to respond and react appropriately, at a level reasonably required of them, during an emergency.
- Medical and pharmaceutical supplies and services required for emergency response must be specified in the safety case.
- The safety case must demonstrate that machinery, equipment and control systems are fit for their function or use in the emergency.
- The safety case must provide adequate emergency communications systems within and external to the facility. These systems must be protected so as to be capable of operation in an emergency to the extent specified by the formal safety assessment.
- The safety case must describe a system in place for vessel and aircraft control that is capable of meeting likely emergency response requirements.
- The operator must, as part of a safety case, describe an emergency response plan designed to address possible emergencies, the risk of which has been identified in the formal safety assessment for the facility.
- The emergency plan must specify all reasonably practicable steps to ensure the facility is safe and without risk to the health of persons likely to be on the facility at the time of the emergency.
- The emergency plan must specify the performance standards it applies.
- The plan should be simple to comprehend, concise in instruction, and clear in relation to roles and responsibilities.
- Emergency planning must include escape drill exercises and fire drill exercises by persons on the facility. Drills and exercises for other emergencies should also be incorporated into the emergency plan. Emergency planning (including drills and exercises) must take into account possible unexpected scenarios such as blocked escape routes and the failure of evacuation and escape devices and equipment.
- Provision for assessment and continuous improvement of the emergency response plan must be put in place.

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Abbreviations/Acronyms

ALARP	As Low As Reasonably Practicable
EERA	Evacuation, Escape and Rescue Analysis
ERP	Emergency Response Plan
ERT	Emergency Response Team
FPSO	Floating Production, Storage and Offloading
FSA	Formal Safety Assessment
FSO	Floating Storage and Offloading
HUET	Helicopter Underwater Escape Training
MAE	Major Accident Event
MODU	Mobile Offshore Drilling Unit
NOPSEMA	National Offshore Petroleum Safety and Environmental Management Authority
OIM	Offshore Installation Manager
OHS	Occupational Health and Safety
OPGGS Act	*Offshore Petroleum and Greenhouse Gas Storage Act 2006*
OPGGS(S) Regulations	Offshore Petroleum and Greenhouse Gas Storage (Safety) Regulations 2009
OPITO	Offshore Petroleum Industry Training Organisation
PIC	Person In Charge
SMS	Safety Management System
SSIV	Sub Sea Isolation Valve

Key Definitions for this Guidance Note

The following are some useful definitions for terms used in this guidance note. Unless prescriptively defined in Offshore Petroleum and Greenhouse Gas Storage (Safety) Regulations 2009 [OPGGS(S) Regulations 2009] [as indicated by the square brackets] they are a suggested starting point only.

ALARP	This term refers to reducing risk to a level that is As Low As Reasonably Practicable. In practice, this means that the operator has to show through reasoned and supported arguments that there are no other practicable options that could reasonably be adopted to reduce risks further
Emergency	In relation to a facility, means an urgent situation that presents, or may present, a risk of death or serious injury to persons at the facility [OPGGS(S) sub-regulation 1.5(1)].
Major Accident Event	(MAE) an event connected with a facility, including a natural event, having the potential to cause multiple fatalities of persons at or near the facility [OPGGS(S) sub-regulation 1.5(1)].
Safety Management System	(SMS) in relation to a facility, means a system for managing occupational health and safety at the facility [OPGGS(S) sub-regulation 1.5(1)]. It comprises all policies, objectives, roles, responsibilities accountabilities, codes, standards, communications, processes, procedures, tools, data and documents for managing safe operation of the facility. In the context of the OPGGS(S) Regulations 2009, the SMS comprises all these aspects with a strong focus on the prevention, reduction or mitigation of MAEs. The SMS is not just documentation but is the actual implementation of processes, systems, procedures and practices on the facility.
Control Measure	A Control Measure is any system, procedure, process, device or other means of eliminating, preventing, reducing or mitigating the risk of major accident events arising at or near a facility. Control measures are the means by which risk to health and safety from MAEs are eliminated or minimised. Controls can take many forms, including physical equipment, process control systems, management processes, operating or maintenance procedures, the emergency response plan, and key personnel and their actions.
Performance Standard	A performance standard means a standard, established by the operator, of the performance required of a system, item of equipment, person or procedure which is used as a basis for managing the risk of an MAE [OPGGS(S) Regulation 1.5].
Likely	In terms of an emergency scenario, is an emergency event that can be reasonably foreseen.
Operator	The operator, in relation to a facility or proposed facility, is the person who, under the regulations, is registered by NOPSEMA as the operator of that facility or proposed facility [OPGGS Act Schedule 3, Clause 5 & OPGGS(S) Regulations 2009, Chapter 2, Part 1]

1 Introduction

1.1 Intent and purpose of this guidance note

This document is part of a suite of documents that provide guidance on the preparation of safety cases for facilities in Australia's offshore petroleum industry, as required under the Commonwealth Offshore Petroleum and Greenhouse Gas Storage (Safety) Regulations 2009 [the OPGGS(S) Regulations], and the corresponding laws of each State and of the Northern Territory, where powers have been conferred on NOPSEMA.

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

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 OIMs 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 led 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 operators plan for all types of emergencies that could occur to ensure their response is both efficient and effective to prevent and minimise injuries and fatalities.

This guidance note, 'Emergency Planning', is intended to assist operators through the process of developing an emergency response plan that addresses the requirements of OPGGS(S) Regulations 2009, and to ensure that all types of emergencies that may occur at a facility have been appropriately planned for in advance. This guidance note will be of use to those with responsibility for planning and developing the facility safety case, and those involved in safety case implementation, maintenance, and ongoing risk management.

Figure 1 illustrates the scope of the NOPSEMA safety case guidance notes overall, and their interrelated nature. This guidance note on Emergency Planning should be read in conjunction with the other relevant guidance notes; the full set is available on the NOPSEMA website along with guidance on other legislative requirements such as operator nomination, validation, and notifying and reporting accidents and dangerous occurrences.

Figure 1 – Safety Case Guidance Note Map

The purpose of the guidance is to explain the objectives of the OPGGS(S) Regulations 2009, to identify the general issues that should be considered, and to provide practical examples to illustrate the concepts and potential approaches that can be taken in the preparation of safety cases. It is not the intention of the guidance to provide detailed approaches or detailed regulatory assessment criteria.

Guidance notes indicate what is explicitly required by the regulations, discuss good practice and suggest possible approaches. An explicit regulatory requirement is indicated by the word 'must', while other cases are indicated by the words should, may, etc. NOPSEMA acknowledges that what is good practice, and what approaches are valid and viable, will vary according to the nature of different offshore petroleum facilities and their hazards. This guidance note is not a substitute for detailed advice on the OPGGS(S) Regulations or the Act under which the OPGGS(S) Regulations have been made.

1.2 Summary of the Legislative Requirements

Summary tables of the legislative requirements with respect to providing evidence that the appropriate emergency planning has been undertaken are included as a quick reference throughout this document. **However, the reader is encouraged to work directly from the regulations.**

2 Safety Management System

OPGGS(S) – SMS	
Reg 2.5 (3)	The safety case for the facility must also contain a detailed description of the safety management system that: (d) provides for the continual and systematic assessment of: (i) the likelihood of the occurrence, during normal or **emergency situations**, of injury or occupational illness associated with those hazards; and (ii) the likely nature of such injury or occupational illness; and (e) provides for the reduction to a level that is as low as reasonably practicable of risks to health and safety of persons at or near the facility including, but not limited to: (i) risks arising during **evacuation, escape and rescue in case of emergency**.

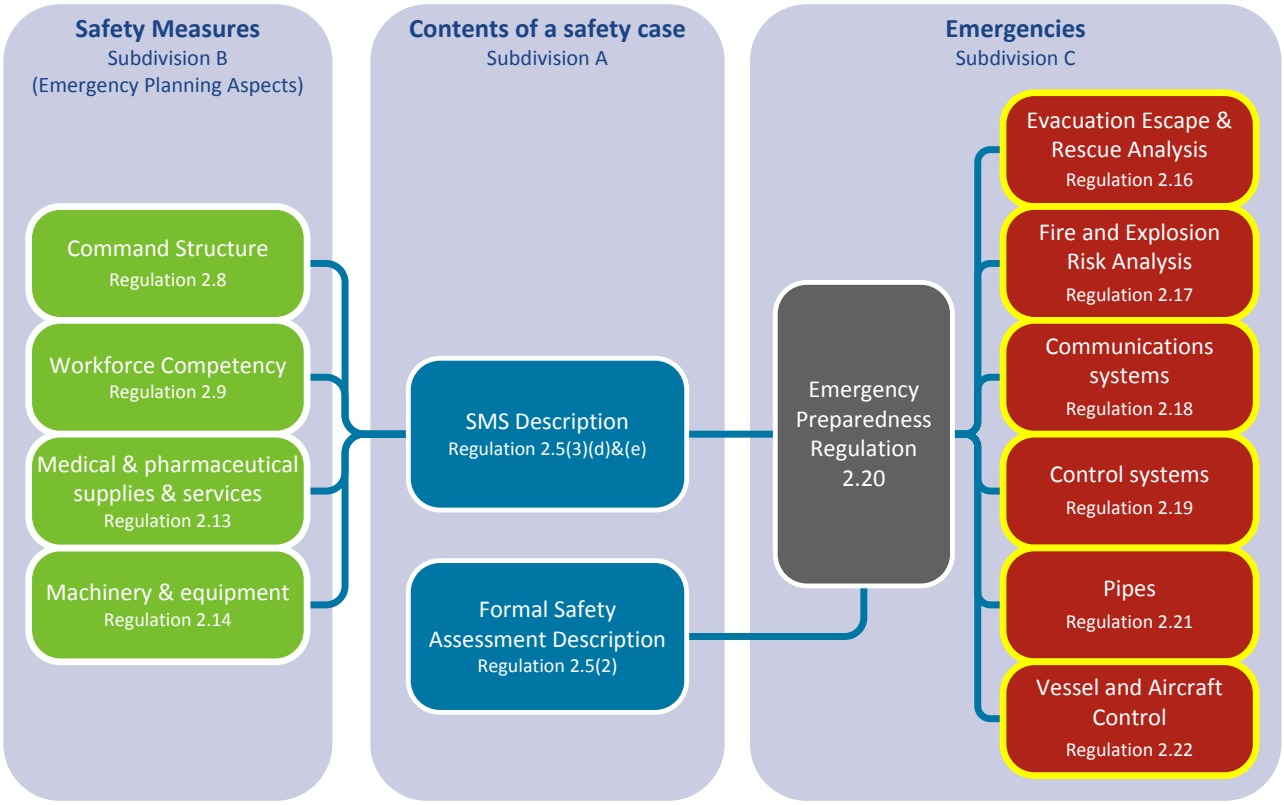
Emergency response planning is covered in several locations within the OPGGS(S) Regulations 2009. Subdivision A of the safety case content requirements, specifically sub-regulations 2.5(3)(d) and (e), contain general goals that the safety management system needs to meet for emergency situations. The OPGGS(S) Regulations 2009 also contain specific items that must be included in the safety case. Subdivision B, titled 'Safety Measures', and Subdivision C, titled 'Emergencies', of the regulations contain these specific requirements.

In summary, the general emergency planning goals that the SMS needs to provide for are:

- 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 integration into the safety case of the more specific content requirements of Subdivisions B and C assists operators in demonstrating that provisions are in place to meet sub-regulation 2.5(3) for emergencies. Figure 2, represents the relationship between the specific contents of Subdivisions B and C and the general emergency SMS requirements of Subdivision A.

Figure 2 - Emergency planning SMS relationship model



Further guidance is available in the NOPSEMA guidance note:
"Safety Management Systems (SMS)"

Further information on continual improvement and ALARP is provided for in the ALARP guidance note.

*Further information on continual improvement and ALARP is available in the NOPSEMA guidance note: "**ALARP**"*

3 Safety Measures

There are four regulations, relating to emergency response, which must be addressed in the safety case according to Subdivision B, titled *Safety Measures*. These are:

- Regulation 2.8 titled Command Structure
- Regulation 2.9 titled Members of the workforce must be competent
- Regulation 2.13 titled Medical and pharmaceutical supplies and services
- Regulation 2.14 titled Machinery and equipment

This section details each and provides guidance to assist operators in providing the necessary content in the facility safety case to comply with the regulations.

3.1 Command Structure

OPGGS(S) – Command Structure	
Reg 2.8	For a facility that is manned, the safety case must specify:
(1)(b)	an office or position at the facility, the occupant of which is responsible for implementing and supervising procedures in the event of an emergency at the facility; and
(1)(c)	the command structure that will apply in the event of an emergency at the facility.

Emergency response involves numerous people working together, in a coordinated manner, to perform a range of tasks in an unstable, changing environment. It is critical that the command structure is clear to all members of the workforce, and onshore response teams, by providing well-defined roles, responsibilities and a chain of command.

Command structures for the facility which may include any onshore response teams, must be described in the safety case. The emergency response command structure is often described with the aid of an organisation chart to enable clear identification of its decision-making hierarchy. The roles and responsibilities need to be described in the safety case for all personnel within the emergency response to provide sufficient detail of the command structure. The command structure must clearly allocate an individual who has overall responsibility for implementing and supervising the emergency response procedures. This role is usually undertaken by the OIM, PIC or Vessel Master.

A typical offshore ERT (Emergency Response Team) may include:

- Emergency Commander
- Deputy Emergency Commander
- Emergency Response Team Leader
- Emergency Response Team members
- Radio Operator
- Muster Checker and Co-ordinator
- Control Room Operator

Other personnel maybe included in the ERT for specific incident response types including support, standby or rescue vessel, drilling, well control or helicopter crews.

3.2 Workforce competency

OPGGS(S) – Members of the workforce must be competent	
Reg 2.9	The safety case for a facility must describe the means by which the operator will ensure that each member of the workforce at the facility has the necessary skills, training and ability: (a)(ii) to undertake routine and non-routine tasks that might reasonably be given to him or her in abnormal **or emergency conditions**; and (b) to respond and react appropriately, and at the level that might be reasonably required of him or her, **during an emergency**.

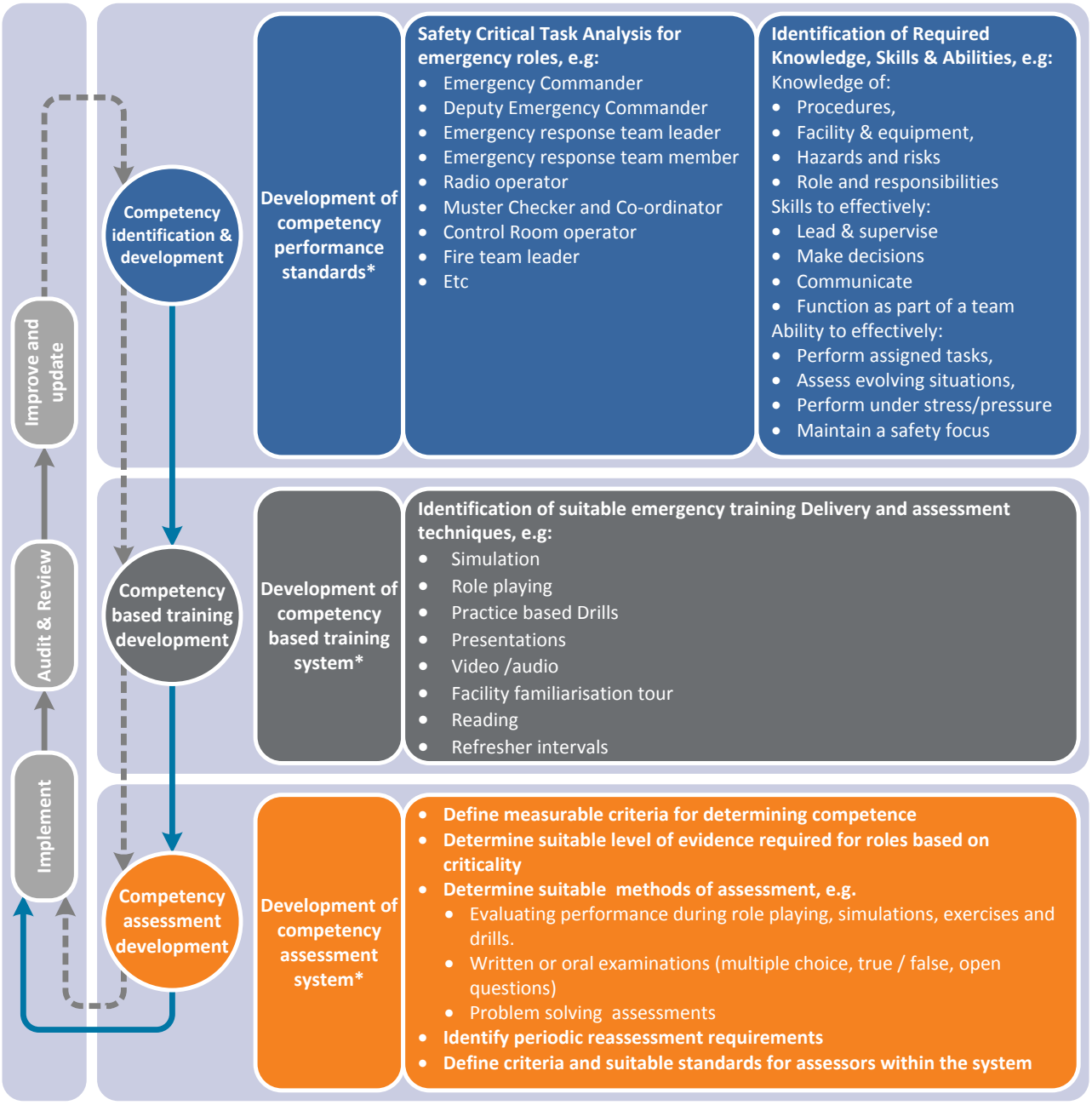
The regulation requires that the workforce must be competent and specifically includes the requirement that the workforce has the required skills, training and ability to undertake tasks, respond and react appropriately in emergencies. This guidance focuses on emergency response competency only and therefore only partially covers the requirements of Regulation 2.9, which also include competencies for routine activities.

Operators must provide a description of the means by which competence is ensured for emergency response team members. In other words, operators must describe their competence assurance process. The SMS general requirements for emergencies require risks to be reduced to ALARP [OPGGS(S) sub-regulation 2.5(3)(e)]. Therefore the competence system description should provide demonstration that all reasonable practicable steps have been taken to ensure the workforce will be competent in performing their assigned duties in an emergency. There are 3 main steps for operators to consider when developing a competence assurance process that complies with Regulation 2.9 and sub-regulation 2.5(3)(e); these are:

1. **Competence Identification** – What abilities and skills does each individual in responding to an emergency need to perform their function? This may include knowledge of equipment and procedures, supervisory and communication skills, safety behaviours and attitudes, and cognitive abilities. Operators need to have a clear understanding of the roles and responsibilities of the workforce in an emergency and criteria for good performance in order to successfully identify their competence requirements. An effective method for identifying competence requirements is using a task analysis enabling identification of critical key competency requirements for individuals in various roles.
2. **Competence Training** – What training is required to develop each individuals required abilities and skill to allow them to perform their functions successfully? Training design, content and delivery methods should all be considered. Training may take a variety of forms including presentation, videos, site tours, practice-based, role-plays and simulations.
3. **Competence Assessment** – How will the company assess the individuals to ensure they perform their roles in an acceptable manner? It is not sufficient to assume competency of staff after training, the operator should also test whether the training has been successful. There are various techniques available for assessment, which may include monitoring the skills and abilities of personnel during activities (including simulations, role-playing, drills and exercises) and/or testing using questionnaires or examinations.

Figure 3 below provides a graphical representation of an emergency response competence system development framework.

Figure 3 - Development framework for emergency response competence assurance process



NOPSEMA expects that operators will have given appropriate consideration to the incorporation of relevant nationally and internationally recognised units of competency during the development of their competency assurance processes.

OPITO based competency standards are often utilised for emergency response training and assessment in the offshore oil and gas industry. However, given that each facility is unique in layout, equipment, processes and procedures there is a necessity for facility-specific training and assessment additional to that of any industry-recognised generic training programmes.

The level of competency training and assessment should be directly proportional to the criticality of the role individuals are required to perform. For example, an Emergency Commander's competency training and assessment requirements should reflect the importance of the role in achieving successful emergency response. Training and assessment in a simulated environment may be warranted for competence assurance. Simulations attempt to replicate real life emergency scenarios and allow training and assessment of cognitive performance to ensure decisions and actions, appropriate to the situation, are made. Cognitive performance testing can identify a range of issues other forms of testing do not, for example, mental saturation and stress induced errors.

The benefits of providing simulated environment training, although an expensive method of competence training and assessment can far outweigh the cost for certain roles, for example, an Emergency Commander or his deputy. In contrast, an offshore worker not part of the emergency team would not usually be expected to undergo as rigorous and costly competency assessment. Completion of a BOSIET, facility induction, a facility assessment questionnaire and ongoing involvement in drills may, in this case, be all that is required with respect to emergencies.

Example: Cognitive Performance

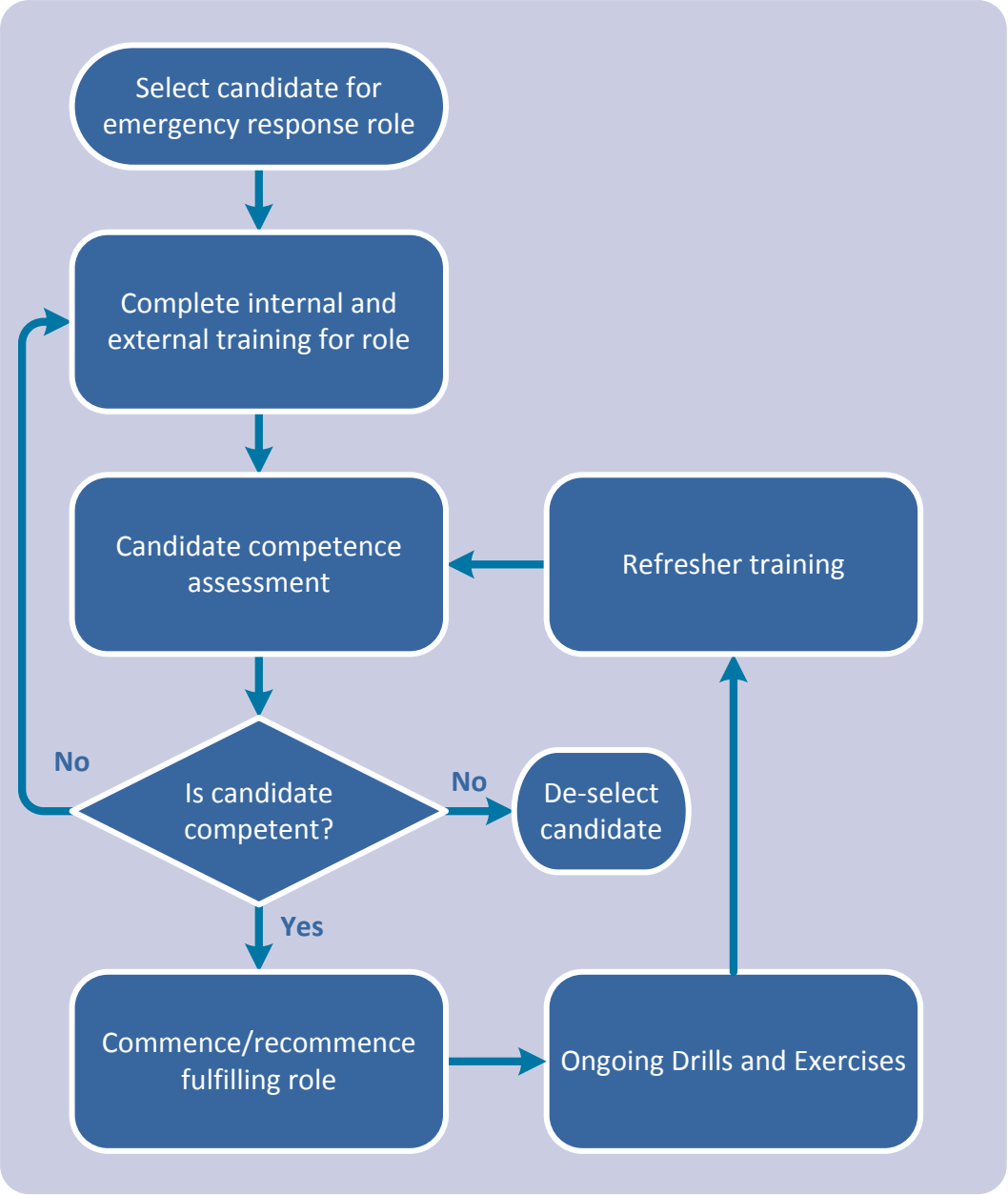
During a life-like emergency response simulation an emergency response team member reverts to his native tongue (which other crew members do not understand) due to the stressful situation. Other methods of training which do not test the person's cognitive ability under pressure would not identify this issue requiring rectification.

An emergency team's competence needs to be considered as well as each individual's competence. The coordination, synchronisation and communication within the team are critical to successful emergency response. Teams therefore should be trained and tested as a whole. This can be demonstrated by commitments to complete emergency response drills, role-playing exercises and simulations. Post exercise review and feedback, is essential to the continued development and improvement of the team's competence.

Emergency situations are 'non-routine' in nature and companies should be aware that the skills and capability to deal with these types of events can easily be eroded over the course of time if not regularly practiced. Operators need to make provisions within their competency programs to take account of any skills and ability fade or decay. The safety case should describe how the operator intends to ensure competency is maintained over time. For example, the operator could describe the refresher training process and commitments for ongoing facility drills and role-playing processes.

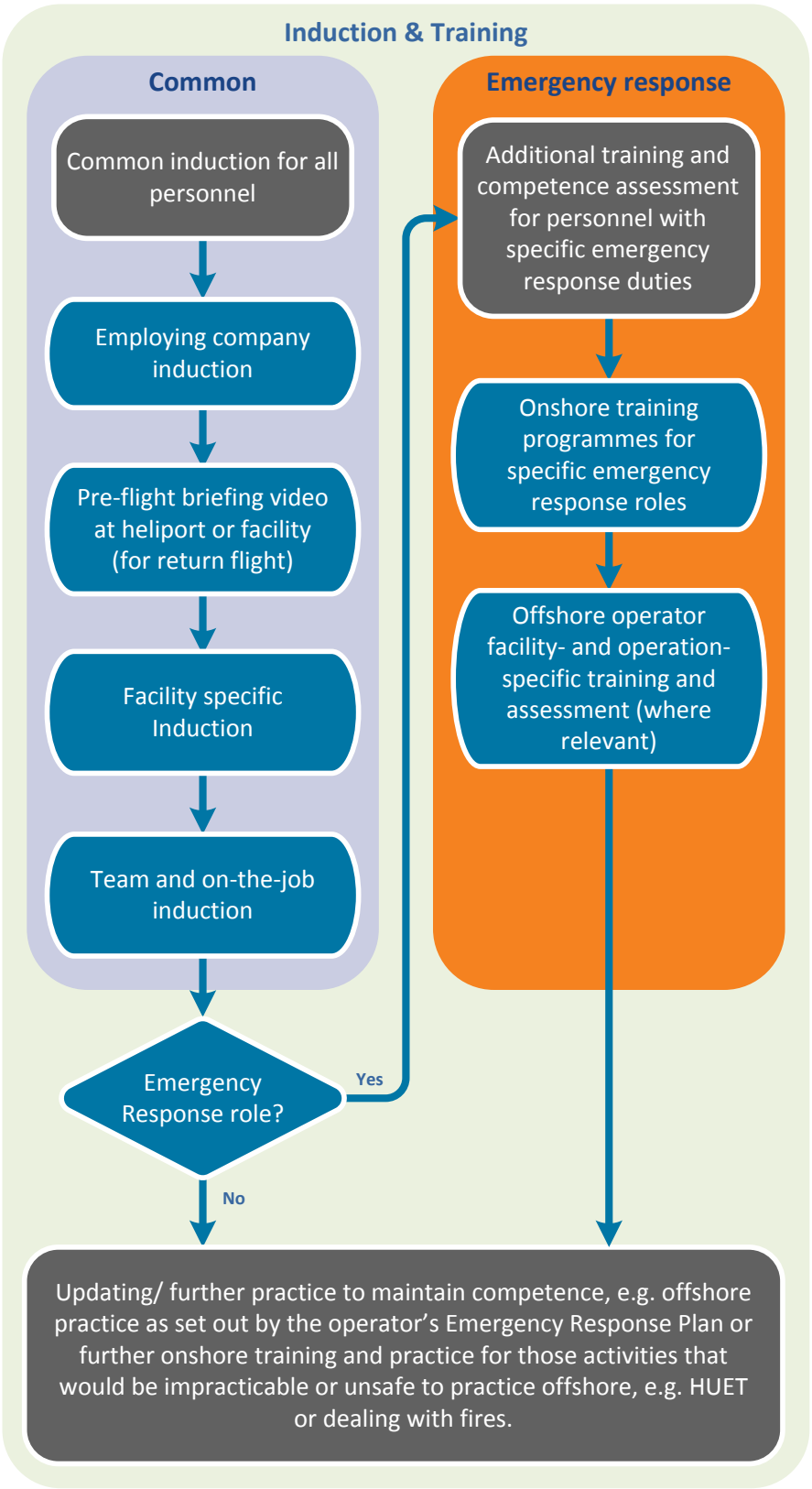
The flowchart in Figure 4 provides a typical staged competency assurance process that an operator may incorporate for individuals involved in the emergency response. The flowchart provides for the necessary steps that the operator should take prior to, and post, an individual's commencement of their role within the emergency response team.

Figure 4 - Staged candidate competency assurance process



Oil and Gas UK provides a process by which an operator can ensure competence of its emergency response team (Oil and Gas UK (February 2010)). An adapted version of the process is illustrated in Figure 5 and combines external training programmes with facility specific training and assessment.

Figure 5 - Competence and training in emergency response process



Further guidance is available in the NOPSEMA guidance note:
"Safety Case Content and Level of Detail"

Further Information is available in the NOPSEMA paper:
"Human Factors Competency Assurance"

3.3 Medical and Pharmaceutical Supplies and Services

OPGGS(S) Medical and Pharmaceutical Supplies and Services	
Reg 2.13	The safety case for a facility must specify the medical and pharmaceutical supplies and services, sufficient for an emergency situation, that must be maintained on, or in respect of, the facility.

The facility description must specify the medical and pharmaceutical supplies available and maintained on, or in respect of, the facility for an emergency situation. This should include location, quantity and storage arrangements for the supplies. The description needs to also contain enough information that demonstrates that the supplies provided are sufficient for emergency situations.

Example: Providing sufficient medical and pharmaceutical supplies

In the case of an oil and gas production facility, it would be reasonable to expect that the on-board supplies would include burns treatment supplies sufficient to allow treatment of multiple persons. Supplies limited to a single individual's treatment may not be considered sufficient given potential for multiple persons to sustain burns at the same time on this type of facility.

The regulation also has a requirement to specify the medical and pharmaceutical services. The description therefore needs to include what services are available to the workforce, which typically include descriptions of:

- the medical centre, its location, equipment and layout
- triage arrangements
- the first aid equipment
- rescue and evacuation equipment
- onshore medical support and equipment
- medical staffing requirements including doctors, medics and first aiders.

NOPSEMA expects that operators will have given appropriate consideration to any relevant national and international guidance and standards, for example, UKOOA guidance on First Aid and Medical Equipment on Offshore Installations (UK Offshore Operators Association, December 2000) provides recommendations on pharmaceutical supplies that may assist the operator in achieving compliance with this regulatory requirement.

However, it should be noted that adoption of industry guidance may not always be sufficient for all emergency situations encountered on a specific facility. It is expected that operators will identify any additional requirements specific to the facility and its operational location.

Example: Providing sufficient medical and pharmaceutical services

A facility operating in a remote location may require access to dedicated medical transport aircraft to transfer injured persons to a suitable hospital for treatment. If this service is necessary it will need to be described in the safety case.

3.4 Machinery and Equipment

OPGGS(S) Machinery and Equipment

Reg 2.14 (1) The safety case for a facility must specify the equipment required on the facility (including process equipment, machinery and electrical and instrumentation systems) that relates to, or may affect, the safety of the facility.

(2) The safety case must demonstrate that:

(b) to the extent that the equipment is intended to function, or to be used, in an emergency — the equipment is fit for its function or use in the emergency.

The regulation requires equipment that is to be used in an emergency to be specified. There is necessarily a certain overlap between this regulatory requirement and others. Sub-regulation 2.5(2)(c) of the formal safety assessment requires the operator to identify all the technical and other controls, to reduce risk to ALARP, and sub-regulation 2.5(1)(b) requires these controls to be described in the facility description. Emergency machinery and equipment identified as controls for an MAE should therefore be already specified and adequately described as technical controls according to Sub-regulation 2.5(2)(c) & 2.5(1)(b). Assuming this to be the case, operators therefore need to specify any additional emergency response equipment that may be needed, which is not already identified and described as an MAE control, in order to comply with Regulation 2.14.

The regulation also requires demonstration that the aforementioned machinery and equipment is fit for its intended function in an emergency. For machinery and equipment that are the technical and other controls to prevent an MAE, refer to the control measures and performance standard guidance note.

For all other machinery and equipment this requirement can be demonstrated by describing the various processes an operator has in place to assure the equipment is, and will continue to be, fit for its intended service. It is not expected that the exact assurance process for every item of equipment be described to demonstrate it is fit for purpose. Instead, it is expected that there is an adequate description of an assurance process in the safety case for emergency response equipment.

The requirements described in this regulation are closely aligned with the SMS sub-regulation 2.5(3)(f), requiring the operator to provide for inspection, testing and maintenance and sub-regulation 2.5(3)(i), which requires specifying performance standards. A description that complies with these two regulations, is therefore likely to comply with the requirements of sub-regulation 2.14(2)(b).

Further guidance is available in the NOPSEMA guidance note:
"Safety management systems"

Further guidance is available in the NOPSEMA guidance note:
"Safety case content and level of detail"

Further guidance is available in the NOPSEMA guidance note:
"Control measures and performance standards"

4 Emergencies

There are seven regulations, relating to emergency response, which must be addressed in the safety case according to Subdivision C, titled 'Emergencies'. These are:

- Regulation 2.16 titled Evacuation, escape and rescue analysis
- Regulation 2.17 titled Fire and explosion risk assessment
- Regulation 2.18 titled Emergency communications systems
- Regulation 2.19 titled Control systems
- Regulation 2.20 titled Emergency preparedness
- Regulation 2.21 titled Pipes
- Regulation 2.22 titled Vessel and aircraft control

This section details each and provides guidance to assist operators in providing the necessary content that complies with the regulations.

4.1 Evacuation, Escape and Rescue Analysis (EERA)

OPGGS(S) – EERA

Reg 2.16 (1) The safety case for a facility must contain a detailed description of an evacuation, escape and rescue analysis.

(2) The evacuation, escape and rescue analysis must:

(a) identify the types of emergency that could arise at the facility; and

(b) consider a range of routes for evacuation and escape of persons at the facility in the event of an emergency; and

(c) consider alternative routes for evacuation and escape if a primary route is not freely passable.

(d) consider different possible procedures for managing evacuation, escape and rescue in the event of an emergency; and

(h) identify, as a result of the above considerations, the technical and other control measures necessary to reduce the risks associated with emergencies to a level that is as low as reasonably practicable

(d) consider different possible procedures for managing evacuation, escape and rescue in the event of an emergency; and

(e) consider a range of means of, and equipment for, evacuation, escape and rescue.

(f) consider a range of amenities and means of emergency communication to be provided in a temporary refuge.

(g) consider a range of life saving equipment, including:

(i) life rafts to accommodate safely the maximum number of persons that are likely to be at the facility at any time; and

(ii) equipment to enable that number of persons to obtain access to the life rafts after launching and deployment; and

(iii) in the case of a floating facility — suitable equipment to provide a float-free capability and a means of launching.

The supporting studies guidance note provides detailed guidance on compliance with Regulation 2.16 regarding the evacuation, escape and rescue analysis and therefore will not be repeated in this guidance note.

Further guidance is available in the NOPSEMA guidance note:
"Supporting Safety Studies"

In relation to emergency management, the operator's emergency response plan (refer to Section 5, page 28) needs to be comprehensive and integrated, incorporating any relevant technical and other controls, identified in the EERA, necessary to reduce risk to ALARP.

4.2 Fire and Explosion Analysis

OPGGS(S) Fire and Explosion Analysis

Reg 2.17 (2) The fire and explosion risk analysis must:

(d) consider the incorporation into the facility of both automatic and manual systems for the detection, control and extinguishment of:

(i) outbreaks of fire; and

(ii) leaks or escapes of petroleum; and

(e) consider a range of means of isolating and safely storing hazardous substances, such as fuel, explosives and chemicals that are used or stored at the facility.

(f) consider the evacuation, escape and rescue analysis, in so far as it relates to fires.

(g) 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 as low as reasonably practicable.

The supporting studies guidance note provides detailed guidance on compliance with Regulation 2.17 regarding fire and explosion analysis and therefore will not be repeated in this guidance note.

Further guidance is available in the NOPSEMA guidance note:
"Supporting Safety Studies"

In relation to emergency management, the operator's emergency response plan needs to be comprehensive and integrated, incorporating any relevant technical and other controls identified in the fire and explosion analysis.

4.3 Emergency Communications Systems

OPGGS(S) – Emergency Communications Systems

Reg 2.18 (1) The safety case for a facility must provide for communications systems that, in the event of an emergency in connection with the facility, are adequate for communication:

(a) within the facility; and

(b) between the facility and:

(i) appropriate on-shore installations; and

(ii) appropriate vessels and aircraft; and

(iii) other appropriate facilities.

Good communication, between all parties, in an emergency is crucial to provide effective emergency response. The regulations identify the need and require that communications systems **must** be provided that are adequate for communicating between all parties involved in the emergency response both internal and external to the facility.

In order to achieve compliance with Regulation 2.18 an operator needs to provide a communications system that:

- describes sufficient means of communication that will allow for successful emergency response
- is capable of handling all MAE and non-MAE emergency scenarios that are likely
- is adequately protected against the MAEs identified in the Formal Safety Assessment (FSA).

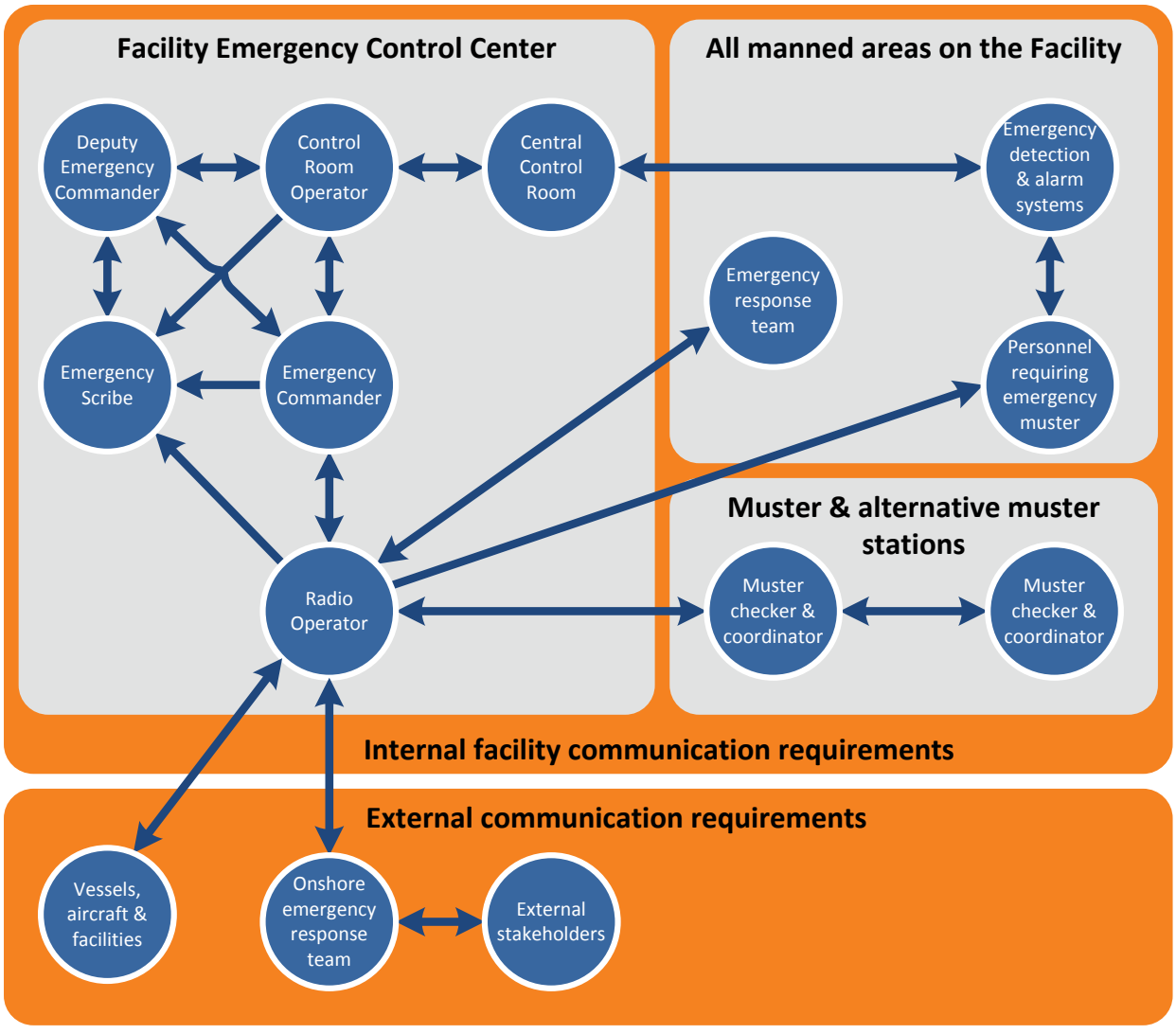
For effective demonstration that the communications systems, internal and external to the facility, meet these requirements it is necessary for operators to determine initially what communication is required. Whilst the emergency command structure may provide indication of communication flow, it lacks the necessary detail required to determine the full extent of the communications flow paths necessary for effective emergency response.

Operators need to consider the following factors prior to determining suitable means of communication during emergencies:

- What information needs shared during an emergency?
- Who needs the information and why?

There are various techniques available that an operator can utilise to analyse their emergency response communication structure. For example, Figure 6 below uses a Social Network Analysis (SNA) technique for communication analysis. The SNA identifies communication paths with the arrows illustrating each communication path and direction, which may be necessary for effective emergency response on a facility.

Figure 6 - Facility emergency response communications network



4.3.1 Describing sufficient means of communication

OPGGS(S) – Emergency Communications Systems

Reg 2.18 (2) In particular, the safety case must provide for the communications systems of the facility to be:

(a) adequate to handle:

(i) a likely emergency on or relating to the facility; and

(ii) the operation requirements of the facility; and

(b) protected so as to be capable of operation in an emergency to the extent specified by the Formal Safety Assessment relating to the facility.

Sub-regulation 2.18(2)(a) requires each communication system, identified by an operator, to be adequate to handle likely emergencies on, or in relation to, a facility. There are various types of communication forms that may be involved in an operator's emergency response, including telephones, radio, computer interfaces, facility public address systems, alarms, speaking (face to face) and written. To assist operators in selection and demonstration that their communication systems are adequate, consideration should be made not only to the physical and environment attributes, but also include consideration of the complex social and technical interactions that are required to take place.

Example: Providing sufficient means of communication in the ECC

Communication requirements within the depicted emergency control centre in Figure 6 would require quite complex interactions for successful communication to occur. In this case there may be a high risk of a team losing sight of the situation and actions required due to miscommunication or misunderstanding. The use of formal communication conventions during emergency situations can help to reduce the risk of misunderstandings. In particular, formal command-response phrases can be implemented to capture and correct communication errors. However, reliance on verbal communication as a solitary means of communication between the emergency commander, his deputy, the radio operator and control room operator may not be suitable. It is therefore not uncommon for an emergency control centre to contain a secondary form of communication. For example, a white board utilised for displaying and updating real time emergency response information. This visual tool assists the team's communication ability by helping to improve situational awareness, identify miscommunication or misunderstanding and clarifying objectives, tasks and status.

4.3.2 Capable of handling all likely MAE and non-MAE emergency scenarios

Operators should ensure their emergency communications systems are capable of handling all likely emergency scenarios. NOPSEMA consider the term 'likely' in the legislation to mean reasonably foreseeable. In the case of MAEs, the operator's communication system is expected to be capable of handling **all** MAEs identified, given that these emergencies have been identified as foreseeable in the formal safety assessment. The communications system should also be capable of handling Non-MAE emergencies.

The communications systems capabilities identified for MAEs would typically cover the majority of Non-MAE scenarios. Any gaps should be identified and additional communication requirements added to demonstrate communication capability for all likely scenarios.

Example: Capable of handling foreseeable emergencies

An alternative emergency control centre may be provided with suitable communications equipment, in case a fire occurred in the primary emergency control centre.

4.3.3 Adequately protected against MAE identified in the FSA

Sub-regulation 2.18(2)(b) requires the communication systems, chosen by the operator, to be adequately protected to allow them to function as intended as specified in the FSA. All MAE-related communication controls therefore need to have adequate protection. The protection requirements for emergency communication controls should be identified as part of the performance standards development process within the formal safety assessment. Refer to the control measures and performance standards guidance note. Particular consideration for survivability and dependency of the systems should be made. Operators need to provide a sufficient description in the safety case on how these communications systems are protected in order to demonstrate their compliance.

Example: Adequate protection of communications systems

An explosion on the facility should not be capable of damaging an alarm system to the extent that it becomes inoperable and the system should not be dependent on main power. An alarm system may therefore include fire or explosion related shielding, have built in redundancy and alternative power arrangements.

Further guidance is available in the NOPSEMA guidance note:
"Control Measures and Performance Standards"

Further guidance is available in the NOPSEMA guidance note:
"Safety Case Content and Level of Detail"

4.4 Control Systems

OPGGS(S) – Control Systems	
Reg 2.19	The safety case for a facility must make adequate provision for the facility in the event of an emergency, in respect of: (a) back-up power supply; (b) lighting; (c) alarm systems; (d) ballast control; and (e) emergency shut-down systems.

There is a degree of overlap between Regulation 2.19 and the formal safety assessment requirements of sub-regulation 2.5(2). The FSA should have identified all of the technical and other controls which would include the above mentioned control systems. The development of performance standards for each will assist the operator in demonstrating their adequacy. It is not expected that each performance standard developed for every control measure will be provided in the safety case. Rather, a description with enough detail to demonstrate the control systems are adequate should suffice. Operators may also choose to describe the contingency measures that they may adopt if a control does not meet its performance standards. Addressing this type of information up front should provide a greater level of flexibility for continued operation under certain circumstances (perhaps with additional controls) rather than relying on the regulator to provide consent to the operator to operate outside the safety case in force for a facility.

The locations of the control systems, operation, interfaces (between users, equipment and other control systems) and their key performance standards should be suitably described in the safety case. NOPSEMA expects that operators will have given appropriate consideration to the incorporation of relevant nationally and internationally recognised standards during the selection of controls systems and the development of their performance standards, however it should be noted that these standards typically do not directly constitute performance standards in themselves.

4.4.1 The back-up power supply

To demonstrate 'adequate provision' a description is required in the safety case of how the operator provides adequate security of electrical power supply to the emergency control systems. It is not expected that a failure of an individual supply route would result in a failure in supply; there is an expectation that back-up power supplies will be provided and suitably described for emergency systems. The description should include the emergency supply system including batteries and generators. The description should also be aligned with the controls identified in the FSA.

4.4.2 Lighting

Emergency lighting is essential to enable fast, effective emergency response. Operators need to demonstrate that their emergency lighting is adequate. The evacuation, escape and rescue analysis (Regulation 2.16), and fire and explosion risk analysis (Regulation 2.17) both include the requirement to address the emergency lighting system. These analyses should consider a range of emergency lighting goals including:

- Ability to enable personnel to easily identify escape routes.
- Provide adequate illumination to enable fast effective traverse along the escape routes.
- Provide adequate illumination of relevant equipment that may be required to be used in an emergency. This equipment may include EEBD (Emergency Escape Breathing Device), manual shutdowns, fire hoses, smoke hoods, eyewash stations, and should all be adequately illuminated so that they can be found and used in an emergency.
- Provide 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.
- Provide safe illumination during all emergencies 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 various types and locations of lighting need to be considered during analysis, to ensure their adequacy. The safety case needs to contain a description of the lighting systems chosen as a result of the analysis and include sufficient detail to demonstrate adequacy, which may include specifying the system's key performance standards, for example, the ability to independently function on loss of power.

Example: Adequate lighting

An operator provides emergency lighting that is only installed on the ceiling, in an accommodation module, with no other lighting source. This arrangement would be unlikely to provide adequate illumination during a fire and smoke filled environment and therefore may not reduce the risks associated with emergency evacuation to ALARP. The addition of floor level escape lighting and photo-luminescent strip indicators would provide more effective emergency escape lighting, given that, in an accommodation fire, the thickest smoke will be located along the ceiling.

4.4.3 Alarm systems

In an emergency, alarm systems need to alert personnel and provide sufficient information to allow personnel to take appropriate action. An emergency alarm can be defined as any alarm that indicates immediate danger to personnel.

Prior to any alarm being activated, the emergency situation needs to be detected. Detection systems therefore are an essential part of any alarm system. The two methods of detection are manual and automatic detection. Manual detection relies on observation by personnel and uses suitable located communications equipment and systems that provide for the ability to raise the alarm, for example – telephones, manual alarm call activation points and radio systems. Automatic detection systems automatically detect an emergency and are independent of any human interaction, for example fire and gas detection systems. These detection systems should be suitably described in the safety case as part of the overall alarm system.

Given that alarm systems are essentially communications systems there is an overlap between regulation 2.18 (Emergency communication systems) and sub-regulation 2.19(c) (Control systems) and therefore reference should be made to the guidance in Section 4.3. Alarm systems can include audio, visual and voice communication systems and their methods of activation can vary from manual to automatic.

Emergency alarms can be categorised into two distinct groupings, namely:

- mustering and evacuation alarms
- emergency response team alarms

Personnel requiring mustering or evacuation will need to know what type of emergency is occurring, in order to take appropriate action. In determining the types of alarms and their locations consideration should be given to:

- the severity of each type of emergency, its probability of escalation, and the speed at which it could escalate
- the typical distribution of personnel to allow for adequate coverage on the facility
- the environment that the alarm is expected to operate in, for example, high noise areas.

A facility may have several different types of audible and visual alarms and activation methods depending on specific emergency types. Automatic or manual activated muster and abandon facility audio and visual alarm systems, combined with a public address system, are normally suitable for the majority of emergencies, as the public address system is capable of informing personnel of any additional specific information required for successful response. Unique audio and visual alarms may however be required for specific emergency situations requiring a more rapid response.

Example: Adequate Alarms for mustering and Evacuation

An H_2S release or engine room CO_2 release scenario would require a time-critical evacuation. It may be necessary to install unique automatically activated alarms for these events, enabling prompt evacuation of personnel.

The emergency control centre(s), typically located in the central control room or bridge of a facility, should contain the necessary alarm system interface required by the emergency response team for effective emergency response. The system should be capable of providing adequate data that meets the emergency response team needs, for example the type of alarm, location and its significance. Any alarms occurring that do not require attention by the emergency response team are considered nuisance and can significantly impact on their performance. It is expected that the facility alarm system will meet industry recognised standards and guidance, where appropriate. EEMUA 191:2007 identifies the following 8 characteristics that should be considered in the establishment of a good control centre alarm system:

- 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 – indicting the importance the operator deals with the problem
- 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
- Focusing – drawing attention to the most important issues

The safety case will need to contain a description of the mustering, evacuation and emergency response team alarm systems with sufficient detail to demonstrate their adequacy. The operator should consider specifying the system's key performance standards, as identified as part of the FSA. The description provided should be aligned with the outcomes of the evacuation, escape and rescue analysis (Regulation 2.16) and the fire and explosion risk analysis (Regulation 2.17).

Example: Adequate Alarms in the Emergency control centre

To ensure the response team are capable of managing each alarm in an effective manner the control centre alarm system may be designed to a performance standard that specifies a maximum quantity of alarms allowed over a certain period of time. This would prevent alarm flooding conditions that cause emergency response teams to get overwhelmed by the number of alarms being brought to their attention by the system.

4.4.4 Ballast systems

The requirement that must be met is for the safety case to make 'adequate provision' for the facility in respect of ballast systems, where relevant. A description of the ballast control system in the safety case is therefore necessary where ballasting is a control measure which reduces risk (i.e. for floating facilities). Ballast systems play a critical role in emergency response in stability or buoyancy emergencies for floating facilities. In demonstrating the systems suitability, key points to consider include:

- the location of the ballast control system in relation to the emergency response team (i.e. ability to access the ballast system control; both automatic and manual)
- alternative modes of operation including local ballast control and manual operation of pumps and valves
- dependency on power sources
- survivability in flooding conditions
- potential for single mode failure of the system
- dependency on other systems
- suitability of user interface
- provision of contingency planning emergency procedures for all foreseeable hazards.

The description of the ballast control system should be aligned with the outcomes of the FSA and identified performance standards. Refer to the control measures and performance standard guidance note for further information.

Example: Adequate ballast system control

A semi-submersible is typically fitted with electrically actuated ballast control valves some of which may (only) be locally controlled. This type of system may be vulnerable to loss of electrical functions or inadvertent operation in a flooding situation of a column or pontoon. Therefore the operator may be unable to demonstrate the system has adequate provisions in place for flooding. A control system that has pneumatic or hydraulic valve actuators, being electrically controlled from outside the watertight division may provide for a more suitable system capable of surviving a flooding emergency

4.4.5 Emergency shutdown systems (including blowdown)

To demonstrate 'adequate provision' a description is required in the safety case of how the operator provides adequate emergency shutdown systems (including blowdown). The description should also be aligned with the controls identified in the FSA to reduce risk to the health and safety of people to ALARP. Consideration should be given to the following characteristics of a good emergency shutdown system:

- inherently fail safe system (isolation fail closed, blowdown fail open on loss of power medium or signal)
- appropriate protection of non-failsafe devices are required with justification
- provision for both manual and automatic shutdown methods
- provide automatic shutdown on excursion from safe operation limits
- ability to minimise hydrocarbon inventories during an emergency
- reduce the likelihood of pressure vessel failure in the event of a fire and during subsequent escalation
- system manual activation points readily accessible to personnel
- capable of surviving for the time required to perform its function
- ability to minimise ignition sources during a hydrocarbon release.

Example: Adequate Emergency shutdown systems

A manual shut-down for a fuel supply to a diesel generator room is located within the same enclosure as the generators. If a fire occurred within the space and upon failure of the automatic shutdown system, a response team member would be required to manually shutdown the fuel supply down. To complete the task the person would need to enter the location and be exposed to the fire. The operator may, for this type of configuration, be unable to demonstrate the system has adequate shutdown provisions in place for an engine room fire emergency.

Further guidance is available in the NOPSEMA guidance note:
"Supporting Safety Studies"

Further guidance is available in the NOPSEMA guidance note:
"Control Measures and Performance Standards"

Further guidance is available in the NOPSEMA guidance note:
"Safety Case Content and Level of Detail"

4.5 Pipes

OPGGS(S) – Pipes

Reg 2.21 (1) The safety case for a facility that is:

(a) connected to one or more pipes; or

(b) proposed to be connected to one or more pipes;

that convey, or will convey, petroleum or greenhouse gas substance to the facility must specify adequate procedures for shutting down or isolating, in the event of emergency, each of those pipes so as to stop the flow of petroleum or greenhouse gas substance into the facility through the pipe.

(2) In particular, the procedures must include:

(a) effective means of controlling and operating all relevant emergency shut-down valves for a pipe; and

(b) a fail-safe system of isolating a pipeline in the event of failure of other safety devices for the pipe.

(3) The safety case for a facility must also specify:

(a) adequate means of mitigating, in the event of emergency, the risks associated with each pipe connected to the facility; and

(b) a frequency of periodic inspection and testing of pipe emergency shut-down valves that can reasonably be expected to ensure that they will operate correctly in an emergency.

(4) In this regulation: facility does not include:

(a) a well mentioned in paragraph 4(4)(a) or (b), or in subparagraph 4(8)(b)(i) or (ii), of Schedule 3 to the Act; or

(b) plant and equipment associated with a well mentioned in any of those provisions; or

(c) a pipe or system of pipes mentioned in any of those provisions.

The regulation is intended to ensure operators provide adequate means of protection to prevent large inventories of hydrocarbons being able to enter the facility, from pipes, during an emergency. Hence, all hydrocarbon production facilities that must demonstrate compliance with this regulation, including:

- FPSO (Floating Production, Storage and Offloading) and FSO (Floating Storage and Offloading) facilities
- Fixed-platform production facilities
- MOPU (Mobile Offshore Production Units) &TLP (Tension Leg Platform) facilities
- any other facilities, as defined by Clause 4 of Schedule 3 to the OPGGS Act 2006, that are connected to a petroleum or greenhouse gas pipe (excluding that mentioned in sub-regulation 2.21(4)(a), (b) and (c)).

Typically this regulation will not be relevant for Mobile Offshore Drilling Unit (MODU) facilities.

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(s) of hydrocarbons. The safety case must specify adequate procedures for shutting down or isolating a pipe's inventories, in order to stop flow 'into' the facility. It should be noted that Regulation 2.21 does not include provision for shutdown valves situated on the facility, rather only includes isolation and shutdown devices prior to inventories entering a facility.

To comply with Regulation 2.21 the safety case must:

- **(2)(a) Include effective means of controlling and operating all relevant emergency shut-down valves for a pipe.** Operators should provide a detailed description of their pipe shutdown arrangements, including descriptions of the shutdown equipment, philosophy, automatic and manual operation functions and locations of the control systems. A detailed description of these systems must be contained in the Facility Description. The Formal Safety Assessment should provide adequate demonstration the system will be effective.
- **(2)(b) Include a fail-safe system of isolating a pipeline in the event of failure of other safety devices for the pipe**. The operator must include a fail-safe 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 another system) may provide suitable fail-safe isolation of a well, if the primary shutdown devices on a well tree were rendered inoperable. A detailed description of the fail-safe system of isolating should be provided in the Facility Description.
- **(3)(a) Specify adequate means of mitigating, in the event of emergency, the risks associated with each pipe connected to the facility.** The FSA should have identified the risks with any pipe or pipes being connected to the facility, and have identified the required mitigation control measures to reduce the risk to health and safety to ALARP. Reducing the risk to ALARP demonstrates the means are adequate. Additionally the facility description needs to provide a description of these mitigation controls. Mitigation measures may include, for example, safely located and adequately protected pipelines and their associated control systems, preventing them from being easily damaged and resulting in an emergency situation.
- **(3)(b) Specify a frequency of periodic inspection and testing of pipe emergency shut-down valves that can reasonably be expected to ensure that they will operate correctly in an emergency.** The safety case should recognise the criticality of hydrocarbon inventory isolation and therefore have a specific requirement for the operators to specify what maintenance and inspection will be completed to ensure the pipe shutdown systems will function in an emergency. It is expected that the inspection, testing and maintenance commitments reflect the criticality of the system. Operators should meet industry recognised good practice, standards and guidance where appropriate for inspection, testing and maintenance.

Example: Pipeline isolation and shutdown

A safety case describes a pipeline that transfers hydrocarbons from the facility to an onshore location. The pipeline is connected to an emergency shutdown down valve at the facility with no further shutdown or isolation systems installed. The operator may be unable to demonstrate the system has adequate shutdown provisions in place to demonstrate compliance due to the system being unable to shut down or isolate the pipe prior to entering the facility.

Further guidance is available in the NOPSEMA guidance note:
"Safety Case Content and Level of Detail"

Further guidance is available in the NOPSEMA guidance note:
"Control Measures and Performance Standards"

4.6 Vessel and Aircraft Control

OPGGS(S) – Vessel and Aircraft Control	
Reg 2.22 (1)	The safety case for a facility must describe a system, that is implemented or will be implemented, as part of the operation of the facility that ensures, as far as reasonably practicable, the safe performance of operations that involve vessels or aircraft.
(2)	The system must be able to meet the emergency response requirements identified in the Formal Safety Assessment in relation to the facility and be described in the facility's Safety Management System.
(3)	The equipment and procedures for ensuring safe vessel and aircraft operations must be fit for purpose.

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. The system needs to be described sufficiently for both routine operations and emergency response situations. This guidance note focuses on emergency response aspects of Regulation 2.22 only.

Vessels and aircraft may have critical roles to undertake during an emergency at a facility including emergency response, evacuation or simply maintaining a safe distance. The FSA should have identified these roles and requirements as part of the controls to prevent MAEs. The operator's system in place to manage vessels and aircraft should be capable of achieving these identified controls. The operator's system, which should be described in the safety case, for vessels and aircraft control should consider the following:

- adequate and effective marine navigation system and aids
- adequate and effective communication systems, including alarms
- adequate radar and detection systems
- clear emergency response roles and responsibilities of vessels and aircraft
- adequate and effective facility proximity controls (entry into the 500 metre safety zone)
- well defined vessel and aircraft emergency response actions
- clear command and control hierarchy
- establishment of minimum performance standards for vessels and aircraft depending on their functions to ensure fitness for purpose
- clear description of equipment on vessels and aircraft, and their capabilities to perform specified functions/roles
- means of auditing vessel and aircraft compliance.

5 Emergency Response Plan

5.1 Description

OPGGS(S) – Emergency Preparedness	
Reg 2.20 (1)(a)	The safety case for a facility must describe a response plan designed to address possible emergencies, the risk of which has been identified in the formal safety assessment for the facility.

The operator must prepare an emergency response plan (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 whereby persons are considered to be in a place of safety. Operators must ensure, when developing their ERPs, they are capable of dealing with all types of likely emergencies identified in the FSA. Oil and Gas UK provides useful guidance on the development of an emergency response plan, which includes the following steps:

1. Setting strategic objectives
2. Defining a set of proposed ER arrangements
3. Analysis and development of ER arrangements against strategic objectives and ALARP
4. Setting Performance Standards
5. Implementation
   (Oil & Gas UK, June 2010)

The fundamental requirements for creating a good ERP include:

- provision for all potential stages of emergency response, including:
  1. Detection of the emergency
  2. Alarm
  3. Muster
  4. Assessment and response to emergency
  5. Evacuation and escape
  6. Rescue and Recovery
  7. Place of safety
- have a well-defined command structure detailing key personnel, roles and responsibilities and organisation structure (refer to Section 3.1, page 8)
- establishment of clear reliable methods of communication (refer to Section 4.3, page 17)
- be aligned with, and capable of addressing, all MAEs identified within the FSA
- consideration of the findings of the fire and explosion risk analysis (FERA)
- consideration of the findings of the escape, evacuation and rescue analysis (EERA)
- integration of the emergency response supplies, services and equipment into the plan, where appropriate, including medical provisions
- consideration of all external parties that may have a role in the emergency response
- provision of contingencies planning, this may include for example the unavailability of personnel with critical roles
- consideration of the location in which the facility will operate and its effect on the ERP
- be simple to comprehend, clear and concise in instruction

- provision for continuous improvement. Sources may include 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.

Example: An operator submits a safety case that contains its entire ERP document as an appendix to the safety case. No description of the ERP is provided in the safety case. In this situation, the safety case would not meet the requirements of Regulation 2.20, and therefore may be rejected by

Example: An operator submits a safety case that contains a description of activities that includes saturation diving on the facility. The description of the ERP plan fails to describe any emergency response plan for divers. In this case, the safety case would not meet the requirements of Regulation 2.20, and therefore may be rejected by NOPSEMA.

OPGGS(S) – Emergency Preparedness: Response plan

Reg 2.20 (1)(b) The safety case for a facility must provide for the implementation of that plan.

Operators must demonstrate that their emergency response plan will be executed in a timely and reliable manner according to its commitments. Usable and readily available procedures and processes are therefore fundamental to demonstrating there are provisions are in place to allow effective implementation.

During an emergency situation, personnel may be exposed to elevated levels of stress. This can affect the performance of individuals and, in particular, emergency response command and control personnel. The combination of stress with a high level of mental workload and complexity of tasks can lead to significant diminishment of their ability to successfully manage an emergency.

The ERP procedures and processes should be constructed in a way as to provide assistance to personnel to perform reliably and effectively. The procedures and processes should assist in reducing the likelihood of human error in the way the ERP is implemented. Consideration should be given to the following:

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

While preparing emergency procedures, consideration should be given to the following:

- the structure of the document
- the target audience for each section
- control and distribution
- maintenance and updates

The safety case should contain a description of the procedure and processes that will allow for the effective implementation of the ERP.

Further guidance is available in the NOPSEMA guidance note:
"Safety Case Content and Level of Detail"

5.2 Reasonably practicable Steps and Performance Standards

Level of Detail Requirement

Reg 2.20 (2) The plan must:

(a) specify all reasonably practicable steps to ensure the facility is safe and without risk to the health of persons likely to be on the facility at the time of the emergency; and

(b) specify the performance standards that it applies.

The operator's ERP must specify reasonably practicable steps that are required to ensure the facility is safe. In order to demonstrate this, the operator should, during development of the ERP, consider whether the ERP meets the principles of ALARP. Section 5.1 of this document outlines a 5-stage development process which includes an ALARP study. The operator should ensure the ERP has steps in place to cover all types of emergency that are likely to occur. Further, during development of the plan, the operator should integrate the relevant technical and other controls identified in Subdivision B (Safety measures), Subdivision C (Emergencies) and the FSA. Refer to Figure 7 on the next page.

There is also the requirement to specify the performance standards that apply. Performance standards should already be developed for all technical and other controls that the ERP relies on (refer to the control measures and performance standards guidance). For example, communications, competency, fire and gas detection, firefighting systems and evacuation, and rescue equipment.

Performance standards also need to be specified for the ERP itself. When determining the performance standards that should apply, operators should take account of all steps in the ERP including:

- detection and alarm
- muster
- assessment and response
- escape and evacuation
- rescue and recovery
- place of safety.

Consideration should be given to the critical requirements, which need to be met, for each step in order to achieve the objectives. The performance standards for different types of emergency may vary and therefore each type requires independent review. The ERP document itself, as opposed to the description of the ERP in the safety case, must specify the performance standards that apply. It should be noted that the safety case should only describe the ERP, including a **description** covering all the performance standards in place, rather than providing each individual performance standard.

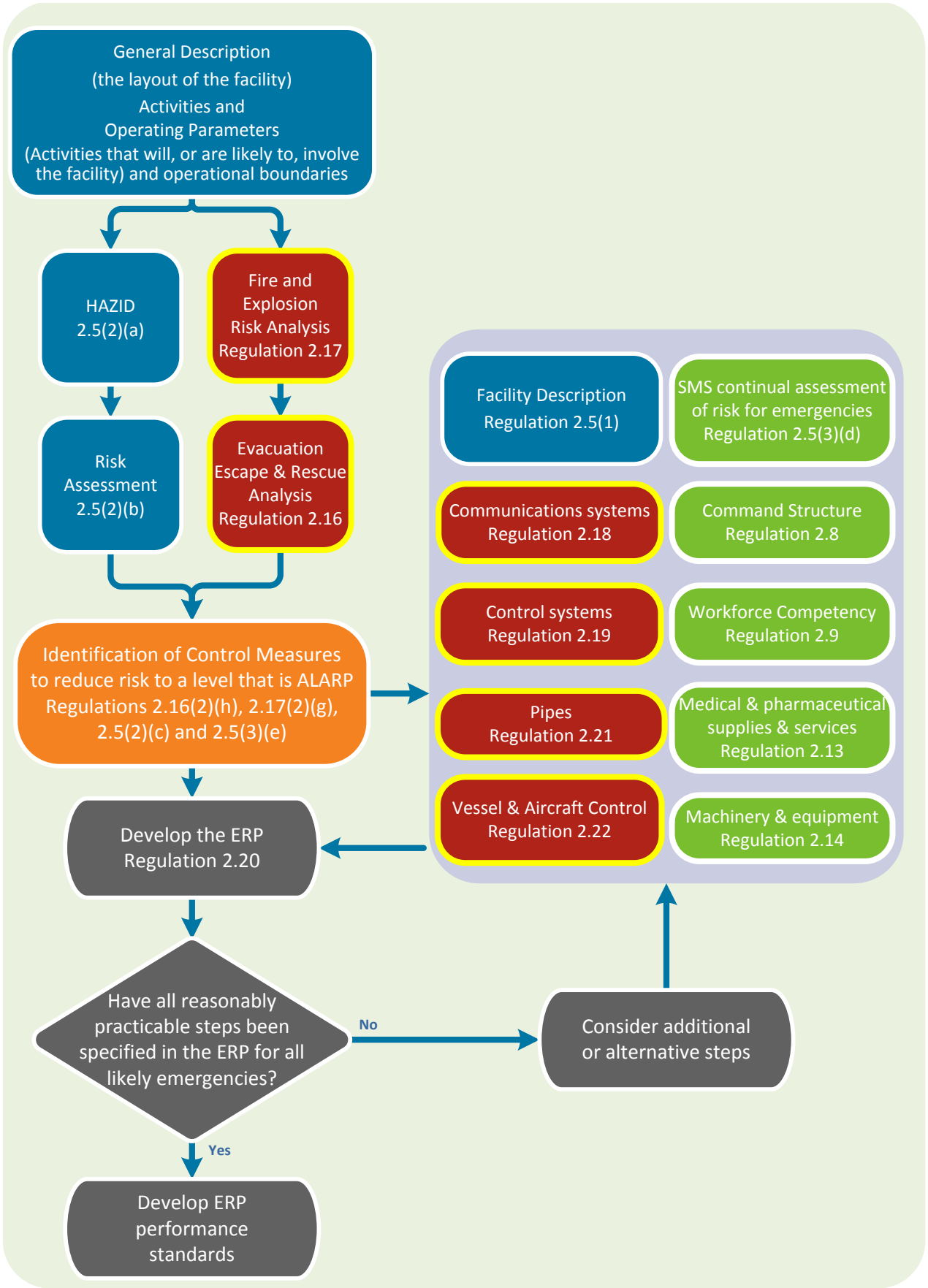
Example: The emergency response plan on a detachable FPSO may include a performance standard, for cyclones, which includes a requirement for the vessel to be ready for sail away within a 12-hour period upon detection of an approaching storm.

Example: A performance standard may be set for a man overboard to be rescued within 15 minutes of detection by use of the fast rescue craft (FRC).

Further guidance is available in the NOPSEMA guidance note:
"**ALARP**"

Further guidance is available in the NOPSEMA guidance note:
"Control Measures and Performance Standards"

Figure 7 - ERP Development Process



5.3 Drills and Exercises

OPGGS(S) – Preparedness - Provision for drills and exercises	
Reg 2.20 (3)	The safety case must make adequate provision for escape drill exercises and fire drill exercises by persons on the facility.
Reg 2.20 (4)	In particular, those exercises must ensure that those persons will be trained to function in the event of emergency with an adequate degree of knowledge, preparedness and confidence concerning the relevant emergency procedures.

The ERP must provide for a means for undertaking escape drill exercises and fire drill exercises. The drills and exercises should be based on possible emergency response scenarios which have been identified in the formal safety assessment. Drills and exercises at the facility provide a useful method of demonstrating assurance that the performance standards identified in the ERP will be met (refer to Section 5.2).

The safety case must describe the system in place that will provide for the completion of escape and fire drills and exercises. A drill and exercise schedule, detailing commitments for each MAE is a useful tool to assist the operator in describing the provisions that are in place in order to meet the requirements of this regulation. The aim of completing drills and exercises is to provide a reasonable level of assurance that the ERP can be relied upon to work effectively during an actual emergency. To demonstrate the drills and exercises provisions are 'adequate', the operator should consider a number of factors that can influence their success. These factors include, but may not be limited to:

- frequency of drills and exercises
- provision for all possible scenarios that could arise
- 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.

A process for post-drill and exercise review should be in place to allow for feedback and improvement. This will need to be described in the safety case to demonstrate the system's adequacy. It may be prudent to include one or more independent observers during drills and exercises that can provide useful unbiased feedback. The process should allow for evaluation upon completion, against the specified performance standards, with a clear focus on continuous improvement. The evaluation process should be described with the safety case.

A description of a feedback and review process should also assist in demonstrating compliance with sub-regulation 2.5(3); refer to Section 2, which details the requirement for continual and systematic assessment of the SMS.

Example: Provision of adequate exercises

For saturation diving campaigns, an operator may make a commitment in the safety case to undertaking a site-specific diver evacuation exercise prior to starting each campaign. The exercise tests the emergency response plan specifically for this scenario and the ability to complete each major stage including:

1. Detection and Alarm of Emergency
2. Escape of personnel to the SPHL (Self Propelled Hyperbaric Lifeboat)
3. Evacuation by launching of SPHL
4. Rescue and Recovery of SPHL
5. SPHL attachment decompression chamber (place of safety)

The exercise is made as realistic as possible by testing the evacuation and recovery equipment and processes and using the personnel who are to be involved in the diving campaign. The testing includes, for example, mating trials on location of the lifeboat to the decompression chamber and SPHL thermal balance testing on location.

5.4 Effectiveness of drills and exercises

OPGGS(S) – Effectiveness of drills and exercises	
Reg 2.20 (4)	In particular, those exercises must ensure that those persons will be trained to function in the event of emergency with an adequate degree of knowledge, preparedness and confidence concerning the relevant emergency procedures.

The safety case needs to describe a system in place that provides assurance that the requirements of sub-regulation 2.20(4) are met. This regulation is an extension of the requirements under Regulation 2.9 to ensure the workforce is competent. As discussed previously in Section 3.2, there are 3 main steps in a competence assurance process being; competence identification, competence training and competence assessment. Drills and exercises are an integral part of the competency assessment process. Operators should describe a drill and exercise process 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 the knowledge and skills of individuals that need rectified
- assist in identifying any training system deficiencies.

Drills and exercises should demonstrate in an ongoing basis that the workforce (where required) have the knowledge, understanding and familiarity with the facility and ERP and related systems processes and equipment, this may include:

- the facility emergency plan layout structure and aspects that pertain to their role
- performance standards for emergency equipment
- the facility layout and any areas which present particular rescue challenges
- typical types of emergency that may occur on the facility
- emergency response and escape equipment and locations
- emergency communications equipment
- primary and secondary escape routes
- primary and secondary muster points and temporary safe refuges
- potential hazards to rescue teams
- types of alarm
- ERP checklist, processes and procedures.

OPGGS(S) – Ensuring conduct of drills and exercises	
Reg 2.20 (5)	The safety case must provide for the operator of the facility to ensure, as far as reasonably practicable, that escape drill exercises and fire drill exercises are held in accordance with the safety case relating to the facility.

The safety case must describe the process by which the operator will ensure that drills and exercises are conducted in accordance with the safety case. Such processes may include combinations of planning/scheduling, records, reporting and auditing.

5.5 Mobile Facilities

OPGGS(S) – Systems for Mobile facilities	
Reg 2.20 (6)	The safety case for a mobile facility must also specify systems that: (a) in the event of emergency, are adequate to shut down or disconnect all operations on the facility that could adversely affect the health or safety of persons at or near the facility; and (b) are adequate to give appropriate audible and visible warnings of the shutting down or disconnecting of those operations.

Mobile offshore petroleum facilities include FPSOs, FSOs, MODUs, Accommodation Vessels, Pipelay and Construction Vessels. Such mobile facilities could be working independently or related to and alongside or adjacent another facility.

This regulation requires that the safety case specifies the shut down and disconnect systems in place. These systems will most likely have been identified as part of the formal safety assessment and therefore any description should be aligned with the FSA and associated control measures and performance standards.

Typical emergencies that would require disconnection and or shutdown systems include, but are not limited to:

- an approaching severe weather system requiring shutdown and disconnection
- a blowout during a drilling operation
- a fire or gas release
- loss of dynamic positioning
- an approaching errant vessel on a collision course.

In severe weather conditions, such as category 5 cyclonic conditions, mobile facilities may have to 'disconnect' in order to make the facility safe or to prepare to move to a safer location (e.g. disconnect from turret moorings, disconnect LMRP and riser etc.).

Mobile non-production facilities, when working alongside or adjacent to another facility, may be required to move away to a safer location if it or the other facility has an incident that could develop into a major accident event e.g. hydrocarbon release. In these types of emergency situations, the mobile facility should be capable of safe shutdown of all operations and, where appropriate; disconnection and moving away without adversely affecting the health and safety of persons at or near the facility.

Consideration should also be given to how a mobile facility will move away in the event of a hydrocarbon release in such a way as to avoid ignition sources that could result in fire and/or explosion. Further there is a specific requirement, according to sub-regulation 2.20(6)(b), for adequate and appropriate audible and visual alarms to be in place to provide notification that these systems have been activated. These alarm systems should be adequately described in the safety case.

6 References, Acknowledgments and Notes

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Offshore Petroleum and Greenhouse Gas Storage Act 2006

Offshore Petroleum and Greenhouse Gas Storage (Safety) Regulations 2009

Note: All regulatory references contained within this Guidance Note are from the Commonwealth *Offshore Petroleum and Greenhouse Gas Storage Act 2006* and the associated Commonwealth regulations. For facilities located in designated coastal waters, please refer to the relevant State or Northern Territory Act and associated regulations.

For more information regarding this guidance note, contact the National Offshore Petroleum Safety and Environmental Management Authority (NOPSEMA):

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