NOPSEMA
Australia's offshore energy regulator

GUIDANCE NOTE

Safety management system

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Core concepts

- The operator of a facility must establish and implement a Safety Management System (SMS) which provides a comprehensive and integrated system for the management of all aspects of health and safety, including control measures for major accident events (MAE).
- The SMS is the primary operational and procedural means of ensuring safe operation, which is achieved by managing and assuring the performance of all adopted control measures.
- The SMS needs to address the hazards that are present, and reflect the actual safe practices on the facility. An SMS that is divorced from reality or fails to focus on the specific requirements for safe operation will not meet legislative requirements.
- The regulations do not prescribe any particular standard or model for the SMS. Each facility operator needs to implement a workable system appropriate to the particular facility, its potential major accident events, occupational health and safety hazards, the adopted risk control measures, and resultant level of risk.
- The SMS must be documented, and needs to be accessible and comprehensible to those who use it. Documenting the SMS will enable the operator to test its implementation and assure its performance, and will enable NOPSEMA to test the adequacy of the system and its implementation. A detailed description of the SMS must be contained within the safety case.
- The SMS should be consistent with the safety management approach or philosophy at the facility and the company's overall business management system.
- Those responsible for the SMS should ensure it fully recognises the potential for MAEs at the facility, incorporates understanding of causes and contributors to these MAEs, and activates a commitment to effectively manage the associated risk.
- Management and members of the workforce (where possible) need to participate in the development of the SMS and understand the SMS.
- The SMS should incorporate the generic management system cycle of policy and objectives, planning, implementation, monitoring and evaluation, audit and review, and continuous improvement, so that safety is not only maintained but is improved. The SMS itself should be regularly reviewed and improved.
- Errors, deviations and breakdowns in control measures and corresponding parts of the SMS need to be tracked under the SMS, to provide data on the actual safety performance of the facility. Measurement against performance standards should be used to facilitate this process.
- Checking of safety-critical procedures and elements/equipment against performance standards through ongoing audit and review drives continuous improvement.

- The processes for generating, revising or reviewing a safety case should be incorporated into the SMS, so that the safety case is a product of the established SMS.

Table of contents

Abbreviations/acronyms

JHA/JSA	Job Hazard Analysis / Job Safety Analysis
MAE	Major Accident Event
MoC	Management of Change
NOPSEMA	National Offshore Petroleum Safety and Environmental Management Authority
OHS	Occupational Health and Safety
OIM	Offshore Installation Manager
OPGGS Act	*Offshore Petroleum and Greenhouse Gas Storage Act 2006*
OPGGS(S) Regulations	Offshore Petroleum and Greenhouse Gas Storage (Safety) Regulations 2006
PTW	Permit to Work
QA	Quality Assurance
SMART	Specific, Measurable, Achievable, Realistic, Targeted
SMS	Safety Management System

Key definitions for this guidance note

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 events is eliminated or minimised. Controls can take many forms, including physical equipment, process control systems, management processes, operating or maintenance procedures, emergency response plans, and key personnel and their actions.
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. [OPGGS(S) Regulation 1.5]
Members of the workforce	Members of the workforce' includes members of the workforce who are: (a) identifiable before the safety case is developed; and (b) working, or likely to be working, on the relevant facility. [OPGGS(S) Regulation 2.11(3)]
Safety Management System	A safety management system 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, 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.

1. Introduction

1.1. Intent and purpose of this guidance note

This document provides guidance on the Safety Management System (SMS) in the context of the Offshore Petroleum and Greenhouse Gas Storage (Safety) Regulations 2009. The purpose of this guidance note is to explain the objectives of the regulations, identify general issues that should be considered, and provide examples to illustrate concepts and potential approaches. It is not the intention to describe detailed approaches or the 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***, other cases are indicated by the words ***should***, ***may***, etc. NOPSEMA acknowledges that what is good practice, and what approaches are valid and viable, may vary according to the nature of different facilities and their inherent hazards.

This Guidance Note is not a substitute for detailed advice on the regulations or the Acts under which the regulations have been made. The objective of the regulations with regard to safety management is that the operator should establish and implement a Safety Management System as the operational and procedural systems of control to ensure safe operation of the facility.

The SMS is thus the principal tool with which the operator meets the overall goal of the regulations, and it plays a critical role in MAE prevention and mitigation. It should embrace all attributes of the facility affecting safe operation, over which the operator has direct or indirect control. These attributes may include: - leadership; responsibilities; targets; planning; roles; culture; and the application and maintenance of control measures for safe operation.

The OPGGS(S) regulations do not prescribe a specific standard or model for the SMS, provided the system so established is capable of managing and maintaining the adopted control measures and its content meets regulatory requirements [OPGGS(S) Regulation 2.5(3)].

The regulations require the safety case to demonstrate that there are effective means of ensuring the implementation of the SMS [OPGGS(S) Regulation 2.6], i.e. to apply it in practice – it is not appropriate to develop a document describing a management system which is not actually used to manage safety at the facility. Finally, the OPGGS(S) Regulations require that the safety case demonstrate that there are effective means of ensuring the continual and systematic identification of deficiencies in the SMS leading to continual and systematic improvement of the SMS. This is achieved through describing the processes in place for monitoring, audit and review of the SMS.

Overall, the SMS to control risk on the facility needs to address prevention and control of all health and safety risks.

Figure 1: Safety case guidance note map

Figure 1 illustrates the scope of the NOPSEMA safety case guidance notes overall, and their interrelated nature. The guidance notes themselves are 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.

2. Role of the safety management system

The SMS must provide a systematic means of ensuring safe operation for the facility by managing the adopted control measures in a comprehensive and integrated manner.

Most modern management system "standards" or "models" feature a set of generic elements, forming a continual improvement cycle. For example, Figure 2 shows the basic management elements.

No particular management system model is correct or best; but it is generally recognised that sound management systems are all similar in fundamental terms. Compliance with the OPGGS(S) Regulations does not require any particular standard to be used. However, adoption of a proven standard may assist a facility operator by providing a sound framework on which to base their specific SMS.

Figure 2 - Example – Elements of the generic management system

The safety management system should manage and support those specific aspects of the facility and its operations that form the control measures adopted to prevent and mitigate major accident events. Other health and safety issues (e.g. occupational exposure to chemicals or to noise) are important and should also be managed through the SMS.

Control measures and proactive tools generally addressed in a SMS include:

- design, construction and operational standards and procedures
- corporate and individual knowledge of the facility and its safe operation
- organisation, supervision and resourcing of tasks and processes required to ensure safe operation
- procedures for managing contractors and 3rd parties
- procedures for personnel selection, training and competency management (including contractors)
- health monitoring
- 'Permit to Work' and equipment isolation procedures
- behavioural safety awareness tools
- management of Change (MoC) procedures

- risk assessment (including JSA/JHA)
- processes to maintain integrity of critical assets (testing, inspection, maintenance, replacement)
- operations/maintenance procedures needing to be performed in order to maintain safe operation
- procedures for procurement and ensuring QA of devices, parts and other commodities (and in particular safety-critical elements) used in the process
- auditing schemes for safety-critical equipment and procedures
- emergency plans and procedures.

There will typically be a variety of control measures managed under the SMS, with control measure improvement actions identified and given priority. The improvement priorities will change over time, as specific improvements are implemented, existing problems resolved, and new problems and improvement opportunities identified.

The SMS, or linked documentation such as safety plans, should explicitly identify the changing priorities for safety management / improvement based on outcomes of the Formal Safety Assessment. This link is fundamental to the safety case regime: the safety management system needs to be based on a robust understanding of the underlying risks.

3. General requirement of the SMS

OPGGS(S) Regulation – Safety Management System Requirements	
Reg 2.5(3)	The safety case for the facility must also contain a detailed description of the safety management system that: (a) is comprehensive and integrated; and (b) provides for all activities that will, or are likely to, take place at, or in connection with, the facility; and (c) provides for the continual and systematic identification of hazards to health and safety of persons at or near the facility; and (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; and (ii) risks arising from equipment and hardware; and (f) provides for inspection, testing and maintenance of the equipment and hardware that are the physical control measures for those risks; and (g) provides for adequate communications between the facility and any relevant: (i) facility; or

(ii) vessel; or

(iii) aircraft; or

(iv) on-shore installation; and

(h) provides for any other matter that is necessary to ensure that the safety management system meets the requirements and objects of these Regulations; and

(i) specifies the performance standards that apply.

Note: The safety management system must provide for all hazards and risks to persons at the facility, not just risks of major accident events.

Note that the SMS itself must meet the requirements of items (a) to (i), not the detailed description of the SMS. It is the intent of the regulations that the detailed description provides evidence that all these matters are addressed in the SMS, using samples/examples where appropriate. It is not intended that the detailed description of the SMS in the safety case include the entire SMS.

Example – Performance standards that apply:

It is the SMS itself which must specify the performance standards that apply, not the detailed description of the SMS in the safety case. However, the detailed description of the SMS in the safety case must provide sufficient evidence to demonstrate to NOPSEMA that the SMS specifies the performance standards that apply.

The detailed description of the safety management system in the safety case needs to provide evidence that the SMS is **comprehensive and integrated** [OPGGS(S) Regulation 2.5(3)(a)]. The SMS should also be accessible, comprehensible, documented, facility-wide, realistic, dynamic and continuously improving.

For the SMS to be **comprehensive** it needs to ensure that anything constituting a control measure is properly implemented and maintained in every sense. This can include:

- identifying the control measures
- defining their performance requirements
- implementing the measures themselves, including the provision of any associated training, etc.
- monitoring and maintaining the control measures against the performance requirements
- rectifying any shortcomings that may arise
- reviewing and improving the control measures.

This should ensure that the operator has an accurate understanding of the actual effectiveness of the control measures in preventing or mitigating major accident events and OHS hazards. Situations where the assumed effectiveness of a control measure is not achieved in practice would indicate that the SMS is not effective in relation to that control measure.

The requirement for the SMS to be integrated recognises the fact that failures in complex systems often stem from a complex combination of circumstances. The SMS not only needs to ensure that hazards are

linked with relevant control measures, but that control measures work together effectively as a whole and, in particular, that they do not conflict with each other.

Control measures should provide layers of protection such that if a particular element does not meet its performance standards, other measures can be brought in or enhanced to achieve an equivalent level of risk reduction. Furthermore, to ensure the core elements of the SMS work together effectively, communications and actions should be linked and consistent throughout the SMS.

The SMS should also contain specific links to the adopted control measures. For example, if monitoring indicates that there are problems in implementation of a particular procedure, this should be reflected in the corrective action processes.

The SMS needs to establish mechanisms by which anomalies in the system are identified, reported on and corrected. This means that the SMS should not only provide for compliance audits against documented SMS element requirements, but should also provide for 'systems' audits to gain assurance that the SMS is achieving the health and safety outcomes as intended.

The SMS should provide a communication, decision-making and action process which is on the look-out for interactions within the system which could combine to cause major accident events, or pose threats to health and safety.

All members of the workforce who use the SMS should be able to gain easy access to parts they need, so that they are well informed of the relevant SMS requirements before carrying out any safety-critical task. The SMS should be written in such a way that the users of the SMS can understand the SMS, and exactly what is required to implement it.

All critical information and decisions should be documented sufficiently to provide an audit trail which will enable NOPSEMA to gain an assurance that the SMS is functioning effectively and is being implemented in practice.

The demonstration required in the safety case in relation to the SMS may need to show evidence of the following:

- The necessary performance standards of each adopted control measure is clearly defined.
- Adopted control measures are inspected, tested and maintained under the SMS such that they are dependable and effective when required and able to perform as intended. For safety-critical equipment this may include verification that the technical controls are fit for their function and use.
- Performance of the control measures is monitored and reviewed against the defined standards.
- Risks are periodically reviewed to see if further controls are appropriate.
- The SMS manages corrective actions to address individual deficiencies or failures in the control measures and to address long-term performance.
- The SMS also manages contingency measures which must be put in place when control measures fail to meet their performance standards and these failures cannot be immediately rectified.
- The workforce are informed, educated and trained as necessary to ensure control measures are operated, tested, maintained and repaired correctly.

- The SMS provides a reliable process for prompting review and revision of control measures if there are changes to the facility, the state of knowledge of hazards, or the associated control measures.
- Any control measures adopted are able to function effectively, do not conflict with or compromise other control measures, and this is not adversely affected by facility or control measures changes.
- The SMS clearly and unambiguously defines what activities are needed to ensure safety improvements, when these activities should take place, and who should carry them out.
- The SMS, if fully implemented, is capable of achieving compliance with all relevant statutory provisions.

The regulations require continual and systematic improvement of the SMS. Continual improvement may mean improving actual safety performance by more diligent application of existing systems, or it may mean improving systems to improve performance or to accommodate the introduction of newly identified hazards.

These concepts are discussed in more detail in the following sections.

4. Elements of the safety management system

4.1. Policy and objectives

It is desirable that Safety Management Systems clearly describe the operator's policy and objectives in relation to health and safety. There is also a duty within Schedule 3 to the OPGGS Act to, where practicable, develop a policy relating to occupational health and safety in consultation with members of the workforce.

OPGGS Act Schedule 3 – Duties of operator	
Clause 9(2)	The operator of a facility is taken to be subject, under subclause (1), to each of the following requirements: (i) to take all reasonably practicable steps to **develop, in consultation with:** **(i) members of the workforce**; and (ii) if a member of the workforce at the facility has requested a workforce representative in relation to the member to be involved in those consultations, that workforce representative; **a policy relating to occupational health and safety** that: (iii) will enable the operator and the members of the workforce to cooperate effectively in promoting and developing measures to ensure the occupational health and safety of persons at the facility; and (iv) will provide adequate mechanisms for reviewing the effectiveness of the measures; and (v) provides for the making of an agreement that complies with subclauses (5) and (6).

OPGGS Act Schedule 3 – OHS Policy Agreement	
Clause 9(5)	**The agreement** referred to in subparagraph (2)(i)(v) must be between: (a) on the one hand—**the operator**; and (b) on the other hand: (i) the **members of the workforce**; and (ii) if a member of the workforce at the facility has requested a workforce representative in relation to the member to be a party to that agreement – that workforce representative.
Clause 9(6)	**The agreement** referred to in subparagraph (2)(i)(v) **must provide appropriate mechanisms for continuing consultation** between: (a) on the one hand—the operator; and (b) on the other hand: (i) the members of the workforce; and (ii) if a member of the workforce at the facility has requested a workforce representative in relation to the member to be involved in consultations on a particular occasion—that workforce representative. The agreement must provide for such other matters (if any) as are agreed between the parties to the agreement.

The policy must enable the operator and the members of the workforce to cooperate effectively in promoting and developing measures to ensure the occupational health and safety of persons at the facility. It must also provide adequate mechanisms for reviewing the effectiveness of the measures and for the making of an agreement between the operator and members of the workforce.

The occupational health and safety policy should include the broad aims in relation to safe operation of the facility, which clearly needs to relate to all of the identified hazards (including MAEs). As part of its inspection activities NOPSEMA may look for evidence that, at a high level, the operator recognises the potential for occupational health and safety hazards and major accident events at the facility, and is committed to controlling the associated risk. In addition to this policy, detailed objectives should be set.

4.2. Organisation and personnel

OPGGS(S) Regulation – Command Structure Requirements	
Reg 2.8(1)	For a facility that is manned the safety case must specify: (a) an office or position at the facility, the occupant of which is in command of the facility and responsible for its safe operation when on duty; and (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 (c) the command structure that will apply in the event of an emergency at the facility. *Note: The same person may occupy both of the offices or positions mentioned in paragraph 1 (a) and (b).*

OPGGS(S) Regulation – Command Structure Requirements

Reg 2.8(2) **The safety case must also describe**, in detail, the means by which the operator will ensure that, as far as reasonably practicable:

(a) the offices or positions mentioned in subregulation (1) are continuously occupied while the facility is in operation; and

(b) the person who occupies each office or position mentioned in subregulation (1) has the necessary skills, training and ability to perform the functions of the office or position; and

(c) the identity of the persons who occupy each office or position, and the command structure can, at all times, be readily ascertained by any person at the facility.

The OPGGS(S) Regulations require the safety case for a facility to specify the office or position, at the facility, in command of the facility and responsible for its safe operation when on duty. This individual is typically the Offshore Installation Manager (OIM) or equivalent position e.g. the master of a vessel if the facility is a vessel. That is, the person who, as far as the workforce at the facility understands is at the top of the chain of command in relation to all activities at the facility and the physical environment at the facility.

The safety case must also specify the office or position responsible for implementing and supervising procedures in the event of an emergency and the command structure that applies in the event of an emergency.

The safety case must describe, in detail, the means by which the operator will ensure the above offices or positions are continuously occupied while the facility is in operation. For example, the safety case should describe how the organisation will address situations of leave or unplanned absences that may occur. It should also define the roles and responsibilities of individuals in relation to ensuring safe operation, and the overall means of ensuring they have the necessary skills, training and ability to enable them to perform these functions.

The safety case must describe how the people in these offices and positions can be readily ascertained by people at the facility. Generally, this is achieved by displaying details in a prominent location on the facility.

OPGGS(S) Regulation – Workforce Competency

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) to undertake routine and non-routine tasks that might reasonably be given to him or her:

(i) in normal operating conditions; and

(ii) in abnormal or emergency conditions; and

(iii) during any changes to the facility; and

(b) to respond and react appropriately, and at the level that might be reasonably required of him or her, during an emergency.

The safety case must also 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 to undertake routine and non-routine tasks. Competency requirements must be established for normal operating conditions, abnormal or emergency conditions and during changes to the facility.

The safety management system of the safety case should also describe the means by which the operator will ensure that each member of the workforce has the necessary skills, training and ability (competency) to respond and react appropriately during an emergency. Competencies should be directly applicable to the scope, context and work environment relevant to the personnel. This should include contractors. 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.

4.3. Operational controls

OPGGS(S) Regulation – Permit to Work System	
Reg 2.10(1)	**The safety case for a facility must provide for** the operator of the facility to establish and maintain a documented system of coordinating and controlling the safe performance of all work activities of members of the workforce at the facility, including in particular: (a) welding and other hot work; and (b) cold work (including physical isolation); and (c) electrical work (including electrical isolation); and (d) entry into, and working in a confined space: and (e) procedures for working over water; and (f) diving operations. *Note: **Confined space** is defined in regulation 1.5.*

OPGGS(S) Regulation – Permit to Work System (Authorisation and Competency)	
Reg 2.10(2)	**The system must:** (a) form part of the Safety Management System described in the safety case in force for the facility; and (b) identify the persons having responsibility to authorise and supervise work; and (c) ensure that members of the workforce are competent in the application of the permit to work system.

Operational controls include all processes and procedures impacting on safe operation, for all modes of operation. Operational controls likely to be of particular importance at offshore facilities are the processes and procedures for operating plant and equipment; maintaining the integrity of that equipment; permitting work; start-up and shut-down of plant; commissioning; decommissioning; achieving safe isolation of equipment; and controlling abnormal conditions.

In relation to permitting work, the safety case must provide for the operator to establish and maintain a documented system for coordinating and controlling the safe performance of all work activities of members of the workforce i.e. a 'Permit to Work' system. The description of the Permit to Work (PTW) system provided in the safety case must identify the persons having the responsibility to authorise and supervise work and describe how the operator will ensure members of the workforce are competent in the application of the PTW system.

4.4. Management of change

Management of Change (MoC) is an essential element of a robust SMS, as changes can introduce new major accident event (MAE) hazards, or impact on risk control measures for existing MAEs. There needs to be effective management of all changes to the facility, including operational, organisational, procedural, and equipment changes. In addition to discrete changes, there must also be the implicit realisation that the risk 'picture' or 'situation' on a facility is a dynamic one – it changes with time, the activities being conducted, the status of the make-up or 'fabric' of the facility, the competence of people (associated with a changing workforce and any changes to plant or procedures), the barriers remaining available and those compromised, etc.

Management of Change needs to track changes to the facility, the activities conducted at the facility, the control measures employed, the technical knowledge relied upon (to formulate the safety case), overall level of risk of major accident events, the human resources and competence levels required to maintain safe operations, and the SMS itself. This monitoring of Management of Change may then trigger reviews and formal revisions to the safety case as necessary. This is described in more detail in the NOPSEMA guidance note *Safety Case Lifecycle Management*.

The obligation is on the facility operator to identify those changes in circumstances which require a revision to the safety case, not the regulator. If the regulator identifies changes in circumstances which require a revision to the facility safety case, this is generally a situation where non-compliance has been identified and usually leads to some type of enforcement action. Therefore, the operator should undertake appropriate planning well in advance of any proposed change. If the proposed change is outside the 'envelope' described in the safety case, this may trigger a revision and formal submission. Amongst other things, the OPGGS(S) Regulations require the operator to submit a revised safety case if the operator proposes to significantly change the safety management system, a description of which is part of a safety case in force for a facility.

OPGGS(S) Regulation – Revision of a safety case (Change of circumstances or operations)	
Reg 2.30(1)	Subject to subregulation (3), an **operator of a facility for which a safety case is in force must submit a revised safety case** to NOPSEMA as soon as practicable after the occurrence of any of the following circumstances: (a) the technical knowledge relied upon to formulate the safety case, including the knowledge of systems for identifying hazards and evaluating risks of major accident events, is outdated so that the safety case no longer adequately provides for the matters mentioned in Subdivisions A, B and C of Division 1; (b) the operator proposes to modify or decommission the facility, and the proposed modification or decommissioning is not adequately addressed in the safety case;

(c) there are reasonable grounds for believing that a series of proposed modifications to the facility would result in a significant cumulative change in the overall level of risk of major accident events;

(d) the operator proposes to significantly change the safety management system;

(e) for a facility that is a pipeline — the compositions of petroleum or greenhouse gas substance conveyed in the pipeline are different from the compositions contemplated in the safety case;

(f) the activities to be carried out at the facility are different from the activities contemplated in the safety case.

4.5. Australian and international standards

OPGGS(S) Regulation – Standards to be applied	
Reg 2.7	**The safety case for a facility must specify** all Australian and international standards that have been applied, or will be applied, in relation to the facility or plant used on or in connection with the facility for the relevant stage or stages in the life of the facility for which the case is submitted.

Examples include standards for development or implementation of operating procedures; engineering design standards; helideck design standards, fire protection standards; maintenance standards; process control systems design basis; etc. Note that these standards are not simply design standards, and must include all standards relevant to the stage(s) in the life of the facility for which the safety case is submitted e.g. construction, installation, operation, modification, etc. The description of the SMS in the safety case should also describe any principles or approaches used in relation to the design or operation of the facility e.g. design principles for control rooms and alarm systems.

4.6. Continuous improvement

OPGGS(S) Regulation – Identification of SMS deficiencies	
Reg 2.6	The safety case for a facility must demonstrate that there are effective means of ensuring: (a) the implementation of the safety management system; and (b) continual and systematic identification of deficiencies in the safety management system; and (c) continual and systematic improvement of the safety management system.

It is recognised that a safety management system for a new operation may not be "bullet proof". Therefore, only by actively monitoring the SMS implementation will deficiencies be identified and corrected. The continuous improvement requirements include a requirement for monitoring, audit and review.

Monitoring comprises the routine checking that activities under the SMS are actually being conducted, the measurement of actual performance of the SMS elements, and the comparison of this performance with the defined performance standards or targets.

Audit is the process of checking that the overall established SMS is understood and is being complied with and that the management framework (in particular the monitoring and corrective action processes) is being implemented and is effective. It can also include evaluation of the degree of compliance against the defined standards. Both quality control and quality assurance are necessary as part of these processes: that is, checks are required that activities occur, that the activities are being performed to a suitable standard; and that the systems, procedures, controls etc. are achieving the desired results.

Common failures in relation to 'audit' include lack of independence, failure to audit and failure to act on audit findings.

Review is the regular but less frequent process of stepping back and asking if the entire system and the standards within it remain adequate, fit-for-purpose, and in line with current good practice. A combination of Monitoring, Audit and Review is necessary to ensure the ongoing effectiveness of the SMS, and to drive continual improvement.

5. Establishing the SMS

Some companies, and in particular operators of multiple facilities, may apply corporate standards for SMS. These may prescribe the entire SMS or only common high-level components, such as the overall policies and procedures.

Many corporate systems specify that local requirements override corporate requirements if they are more stringent. Depending on their corporate requirements and business culture, some companies may employ specific dedicated management systems for individual issues such as health and safety, quality, production, environment and finance. Other companies may employ integrated management systems for the business as a whole. It is entirely up to the operator to choose how the SMS is structured.

In all cases the SMS must provide a management focus on the specific control measures required for safe operation of the particular facility with regard to major accident events and occupational health and safety hazards.

Any corporate or 'standard' management system should be tailored and/or supplemented to reflect the specific conditions and control measures of the facility and the requirements of the regime in which it will be applied. In seeking to identify and apply controls, operators must search out 'systems' (e.g. risk control barriers and procedures, etc.) that offer the greatest control for the simplest configuration. This way they are more likely to gain widespread understanding, acceptance and adoption by the workforce.

The nature of management of major accident event risks may require a different approach to the management of the more common occupational health and safety (OHS) risks, in that the tools and techniques applied to MAE risks are generally different to that applied to OHS risks. This arises from the inherently lower frequency of major accident event type hazards, and therefore requires a more disciplined approach to ensure control of these hazards is not overshadowed by more frequent but less severe hazards. There needs to be a balance between the focus on both MAE risks and OHS risks within the SMS. In order to be used, and to be effective, the SMS needs the understanding and commitment of all persons in the operator's organisation.

6. Performance standards for the SMS

The safety management system for a facility must specify the performance standards that apply [OPGGS(S) Regulation 2.5(3)(i)] - see section 3 above]. The operator should develop a comprehensive set of SMS performance standards which are workable, appropriate to the facility and, above all, ensure the safety of people at the facility.

Performance standards need to be set for the systems and procedures that are in place to gain an assurance that the operator's health and safety objectives are met. The performance standards should also include arrangements for measuring the effectiveness of the SMS and should relate to all aspects of the SMS.

In addition to performance standards for safety-critical procedures, the SMS should also specify performance standards that apply to safety-critical equipment or elements. These performance standards should indicate how each piece of safety-critical equipment is expected to perform under all anticipated conditions, and should clearly describe contingency measures which must be applied if the performance of the equipment falls outside its 'safe operating envelope'. Note that these contingency measures could include ceasing operation until the performance of the equipment is restored.

Performance standards should be of sufficient detail and transparency to enable the effectiveness of the SMS to be apparent from the documentation. They should be defined in such a way as to provide a meaningful measure of effectiveness.

For the purposes of continuous improvement of the SMS, there should also be processes and measures designed to identify and implement improvements to the system itself [OPGGS(S) Regulation 2.6].

Operators should consider the well-known principles of "SMART" (Specific, Measurable, Achievable, Realistic, Targeted) in defining performance standards. Operators should also consider using a combination of performance standards which provide for both leading indicators (ones that measure the activities or inputs of the organisation to managing safety) and lagging indicators (ones that measure the outputs or actual performance achieved).

In order for this process to work it is important to establish performance standards and measurement/monitoring systems which are practical, and which ensure open, comprehensive and accurate reporting of errors or problems. This means the systems should not place an unworkable burden on the workforce, or result in repercussions that may discourage open reporting. The SMS should enable the operator to look into the detail of the performance monitoring information and decide if an absence of evidence of problems really is indicating good health and safety performance, or whether there is a breakdown in recognition or communication of problems.

As part of the SMS description in the safety case, the operator must simply provide evidence (that assures NOPSEMA) that the SMS meets the requirements of [OPGGS(S) Regulation 2.5(3)(i)] (see section 3 above). The operator should explain how performance will be measured and what they will do in relation to seeking evidence that their SMS is not working. This does not require inclusion of the full set of performance standards documentation that may exist in the operator's SMS, but that assurance is to be provided, for example, by a description of the process used in the development of performance standards, a listing of the items to which the performance standards relate and appropriate examples of the content of selected performance standards.

Further guidance is available in the NOPSEMA guidance note:

Control measures and performance standard

7. Critical success factors for SMS

Some of the factors critical for success of a SMS include:

- The SMS must be comprehensive and integrated.
- The SMS must be implemented in practice and used as the primary means of ensuring safe operation.
- The SMS should be consistent with the understanding of risk gained from the Formal Safety Assessment and should include links to the adopted control measures.
- The SMS must be fully documented by the operator of a facility.
- The SMS must be readily accessible and comprehensible to those who use it.
- The detailed description of the SMS provided in the safety case must address the relevant aspects as required by the OPGGS(S) Regulations.
- The SMS should contain the elements of a generic management cycle (for example: define objectives; planning, implementation; monitoring and evaluation, audit and review of performance and continuous improvement in order to strive for improved safety outcomes as well as to act on deficiencies).
- In order to facilitate the above there must performance standards, which enable the operator to measure the effectiveness of the SMS in ensuring safe operation.
- The SMS needs to cover the whole facility defined within the safety case and all of the activities conducted on the facility which expose the people to health and safety hazards and risks.
- All persons involved in operations should be knowledgeable of, and committed to, the SMS.
- The safety case should provide for effective consultation with, and effective participation of, the members of the workforce so that they are able to arrive at informed opinions about the risks and hazards to which they may be exposed on the facility.
- The SMS should be dynamic and continually improving to adapt to changes and to reflect reality.

The SMS should reflect the overall safety culture and values of the operator and the workforce.

8. Safety management system – Suggestions for self-checking

Ensuring the SMS is implemented and effective. Are the procedures within the SMS implemented, and are they effective in ensuring safe operation? Is there effective monitoring, auditing, identification of deficiencies and corrective action? Is the SMS documentation understandable and used by the workforce?

Organisation, structure, roles and responsibilities. Are safety roles and responsibilities clearly defined for all parts of the facility, all levels of the organisation, all operating conditions, and all control measures?

Management of knowledge. Is there an effective system for providing sufficient individual and collective knowledge, skills and experience to operate the facility safely in the first place, and then for retaining that knowledge, skills and experience? Is this system providing sufficient knowledge of critical safe operating

parameters, control measures, hazards, and potential major accident events? Are there sufficient handover mechanisms in place to ensure corporate knowledge is not lost?

Management of change. Are changes to the facility, management systems, organisational structure and human resources analysed and their impacts on safety measured and managed? Are Safety Assessment programmes keeping up with the intended assessment schedules and with plant changes?

Learning from incidents. Are learning opportunities from accidents and dangerous occurrences (commonly referred to as near misses) being properly worked through, from analysis of root causes to communication of lessons and solutions? Does the incident reporting and investigation system facilitate learning or hinder it? Are incidents from the rest of the industry regularly reviewed and acted upon?

Management of human resources. Are there adequate human resources for carrying out all safety roles? Is the management system actually devoting resource to where it is needed for safe operation? Is there an effective process for ensuring the necessary skills and resources are available at all times? Are hand-over requirements properly implemented? Are absences managed correctly? Is there adequate supervision of the workforce and checking of work, response to process information, adherence to procedures?

Communications. Do communications ensure all relevant people are aware of key process conditions, the status of control measures, and other key issues? Do operating, engineering, maintenance and other departments communicate with each other, to use each other's expertise, and to work together effectively to plan and ensure safe operation? Is there effective two-way communication to ensure senior management and the workforce are aware of problems and solutions? Are operational communications unambiguous, or can they be misheard or misinterpreted? Are personnel making correct assumptions about safety-critical issues? What level of checking or verification of communications and operational assumptions occurs? Are there sufficient procedures and mechanisms in place in relation to communications of handovers between different shifts/swings?

Hazardous Activities / Process plant surveillance, facility oversight, trouble-shooting. Is there any routine process for monitoring plant/process/hazardous activity conditions and operational practices to identify abnormal and potentially hazardous conditions? Is process or equipment monitoring information used to identify underlying problems, evaluate trends and assist decision-making? Does any group or individual have an overview of the facility as a whole? Is there sufficient awareness of the potential for interactions between different equipment within a complex integrated facility? Once a potentially significant process deviation develops, is there an effective and timely means of addressing the problem? Are there sufficient procedures, resources and expertise to step back, evaluate and control the situation? Do all personnel have the authority to stop the job if they think it is unsafe, and do they feel empowered to do this if considered necessary?

Have all of the safety implications of abnormalities and deviations been thought through, and procedures developed accordingly? Are hazards spelled out alongside production issues in operating and trouble-shooting instructions?

Recognition of critical safety control measures. Do operators and relevant members of the workforce recognise critical procedures, equipment or control levels and the implications of their failure? Are steps taken to prevent overriding of these measures?

Understanding significance of process information. Are operators able to understand the significance of the signals provided by the process and other monitoring systems regarding the state of the facility? Are all

the necessary critical operating parameters known and their safe operating limits defined? Are critical alarms discernible from, and prioritised over, other alarms? Are operators able to respond to the information being generated by the facility during day-to-day and abnormal conditions, and make safe decisions? Do procedures ensure safe response to alarm and other abnormal conditions? Do operators have the necessary time, resources, support and ability to refer matters to additional expertise or authority if needed?

Production/Schedule demand. Could production demands potentially compromise the ability to operate safely? Is there sufficient time and capacity within the system to be able to limit or halt production on safety grounds? Do production demands result in short cuts being taken with critical control measures?

Emergency response strategies, resources, procedures and communications. Is there a robust and practised emergency response plan, which assists decision-making and reflects the scale, nature and duration of incidents that can occur? Is there an effective communications channel to ensure timely response? Are personnel clear on the roles they should adopt in the event of an emergency? Is there adequate understanding of the overall approach and strategy for fire-fighting? Are adequate resources available to carry out this strategy? Is there up-to-date information on the available inventory, isolation points and isolation priorities? Is a credible emergency isolation and shutdown strategy in place?

Corporate culture. Does the corporate culture lead to a challenging of norms? Is potential for corporate blindness recognised, and guarded against? Is the operator prepared to test and revise their systems for safe operation? Do the communication/reporting systems encourage an open exchange of critical views and information?

9. References, acknowledgements and notes

Offshore Petroleum and Greenhouse Gas Storage Act 2006

Offshore Petroleum and Greenhouse Gas Storage (Safety) Regulations 2009

NOPSEMA would like to acknowledge WorkSafe Victoria for their assistance in the preparation of this guidance documentation.

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 legislation and associated regulations.

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

Telephone: +61 (0)8 6188 8700; or

e-mail: safetycaseguidance@nopsema.gov.au