



Commission for Energy Regulation

An Coimisiún um Rialáil Fuinnimh

Compliance Assurance System

**part of the Safety Case Guidelines under the
Petroleum Safety Framework**

DOCUMENT TYPE:	Consultation
REFERENCE:	CER/15/278
DATE PUBLISHED:	27 th November 2015
VERSION	4.0

*The Commission for Energy Regulation,
The Exchange,
Belgard Square North,
Tallaght,
Dublin 24.
<http://www.cer.ie/>*

Version Control

Version	Reference Number	Changes from Previous Version	Date
1.0	CER/13/254	New document	29 th November 2013
2.0	CER/14/013	Change to safety performance indicators and minor editorial changes	22 nd January 2014
3.0	CER/14/146	Change to safety performance indicators and minor editorial changes	28 th August 2014
4.0	CER/16/tbd	<p>Updated to comply with the Petroleum (Exploration and Extraction) Safety Act 2015. Main responsibility for compliance moved from petroleum undertakings to operators and owners. Reference to SCE changed to S(E)CE - Safety (and Environmentally) Critical Elements.</p> <p>Document split making Parts 1 and 2 of Version 3 separate documents. This document comprises Part 1 and retains the title <i>Compliance Assurance System</i>.</p>	In effect Q1 2016

Table of Contents

1	Introduction	1
1.1	The Petroleum Safety Framework	1
1.2	Purpose of the Compliance Assurance System	1
1.3	Structure and Interpretation	2
1.3.1	<i>Structure of the Document</i>	2
1.3.2	<i>Interpretation</i>	2
2	Verification	4
2.1	Appointment of an ICB by an Operator or Owner.....	5
2.1.1	<i>Competence and Independence</i>	5
2.1.2	<i>Multiple ICBs</i>	7
2.1.3	<i>Change of ICB</i>	7
2.2	Verification Scheme Processes	7
2.2.1	<i>Overview of Schemes</i>	7
2.2.2	<i>Anomalies and Reservations</i>	9
2.2.3	<i>ICB Review of Verification Scheme and Operator or Owner Processes</i>	10
2.2.4	<i>ICB Verification Activities</i>	11
2.2.5	<i>Non-ICB Activities</i>	13
2.3	Safety Case Content, Linkage with Safety Permits and Timings	16
2.3.1	<i>Safety Case Content</i>	16
2.3.2	<i>ICB Submission Timings</i>	17
2.3.3	<i>Production Safety Permit</i>	17
2.3.4	<i>Well Work Safety Permit</i>	18
2.3.5	<i>Decommissioning Safety Permit</i>	19
2.4	Facilities Verification Scheme Requirements	19
2.4.1	<i>Design</i>	19
2.4.2	<i>Construction</i>	20
2.4.3	<i>Production</i>	21
2.4.4	<i>Decommissioning</i>	23
2.5	Well Verification Scheme Requirements	23
2.5.1	<i>Design</i>	24
2.5.2	<i>Well Work Activities</i>	24
2.5.3	<i>Production</i>	25
2.5.4	<i>Suspension</i>	25
2.5.5	<i>Abandonment</i>	25
3	Safety Performance Reporting	26
3.1	Safety Performance Indicators.....	26
3.2	Format and Frequency of Reporting	29
4	Independent Safety Case Review	31
4.1	Independent Safety Case Review Timing	32
4.2	Appointment of an IRB by an Operator or Owner.....	32
4.2.1	<i>Submission to the CER</i>	32
4.2.2	<i>Competence Guidance</i>	33

4.2.3	<i>Independence</i>	34
4.3	General Requirements.....	34
4.3.1	<i>Independent Safety Case Review Scope</i>	34
4.3.2	<i>Workforce Involvement</i>	34
4.3.3	<i>Findings and Reservations</i>	35
4.4	Technical Requirements	37
4.4.1	<i>Management Systems Review</i>	37
4.4.2	<i>Operation of the Verification Schemes</i>	39
4.4.3	<i>Consideration of Petroleum Infrastructure Ageing</i>	39
4.4.4	<i>Review of the ALARP Demonstration</i>	40
4.5	Content of the Independent Safety Case Review Report.....	40
Appendix A.	Example Operational Performance Standard and Facilities Verification Scheme....	42

List of Figures and Tables

List of Figures

Figure 1: Overview diagram of Petroleum Safety Framework.....	3
---	---

List of Tables

Table 1: Verification Scheme documentation requirements for the safety case	17
Table 2: Lagging safety performance indicators	28
Table 3: Classification of releases (as per Guidance for Reporting Petroleum Incidents)	Error! Bookmark not defined.
Table 4: Leading safety performance indicators	29
Table 5: Supporting data	29
Table 6: Safety performance indicator reporting deadlines.....	30

Glossary of Terms and Abbreviations

List of Abbreviations

Abbreviation	Meaning
ALARP	As Low As is Reasonably Practicable
BOP	Blow-out Preventer
CER	Commission for Energy Regulation
ESD	Emergency Shutdown
ICB	Independent Competent Body
ID	Identifier
IMO	International Maritime Organisation
IRB	Independent Review Body
PED	Pressure Equipment Directive (97/23/EC)
PSV	Pressure Safety Valve
QRA	Quantified Risk Assessment
S(E)CE	Safety (and Environmental) Critical Element
S(E)MS	Safety (and Environmental) Management System
SSIV	Subsea Isolation Valve

List of Defined Terms

Words and phrases defined in Section 13A of the Act shall, unless the context otherwise requires, have the same meanings when used in this document.

Term	Definition or Meaning
ALARP Guidance	The <i>ALARP Guidance</i> document, which is part of the Safety Case Guidelines and may be amended from time to time, describes processes that must be used to determine whether a safety risk is ALARP.
Combined Operation (ComOps)	An operation carried out from an installation with another installation or installations for purposes related to the other installation(s) which thereby materially affects the risks to the safety of persons or the protection of the environment on any or all of the installations;
Combined Operations Notification	A notification submitted to the CER in accordance with the requirements of section 8 of the <i>Safety Case Requirements</i> for the purposes of gaining acceptance by the CER to carry out the activities described therein.
Decommissioning Safety Case	A safety case submitted to the CER for acceptance for the purpose of gaining a Decommissioning Safety Permit.
Decommissioning Safety Permit	A safety permit issued by the CER under 13P of the Act which permits the decommissioning activity as set out in the associated Decommissioning Safety Case.
Design Notification	A notification submitted to the CER in accordance with the requirements of section 6 of the <i>Safety Case Requirements</i> for the purpose of gaining acceptance by the CER
Facilities Verification Scheme	A Facilities Verification Scheme is a description of the work carried out by Independent Competent Body(s) to verify whether an operator or owner has identified and continues to meet suitable performance standards for S(E)CEs for pipelines and Facilities (except wells).
Facility	A piece of petroleum infrastructure other than a pipeline.
Framework	The Petroleum Safety Framework established under section 13I of the Act that comprises a collection of regulations, written regulatory documents and procedures which, taken together, describe the system the CER uses to regulate the activities of petroleum undertakings, operators and owners with respect to safety.
Good Practice	The recognised risk management practices and measures that are used by competent organisations to manage well-understood hazards arising from their activities.

Term	Definition or Meaning
Immediate Remedial Action	Means that the operator/owner will put in place immediate risk reduction measures to reduce the risks to ALARP. Immediate remedial action refers to those immediate risk reduction measures taken by operators/owners such as fully or partially suspending production, drilling, simultaneous operations or other work activities (e.g. not allowing or not finalising start-up).
Independent Competent Body	An independent organisation engaged by the operator or owner to execute a Verification Scheme
Independent Review Body	An independent and competent organisation engaged by the operator or owner to carry out an Independent Safety Case Review.
Independent Safety Case Review	A review carried out in accordance with section 4 of the <i>Compliance Assurance System</i> document either as a condition of a safety permit or as a result of a direction by the CER.
Non-production Safety Case	A safety case submitted to the CER for acceptance for the purpose of gaining a Well Work Safety Permit.
Notified Body	The definition of a Notified Body is as per the Pressure Equipment Directive (97/23/EC) or the ATEX Workplace Directive (99/92/EC) as appropriate.
Petroleum Safety (Petroleum Incident) Regulations	The <i>Petroleum Safety (Petroleum Incident) Regulations 2014</i> (S.I. No. 004 of 2014).
Production Installation	A Production Installation is equipment used in the extraction and/or processing of reservoir fluids and includes fixed and floating offshore installations, onshore installations and associated pipelines. A floating production storage and offloading vessel is a Production Installation due to its connection to the reservoir whereas a shuttle tanker is not.
Production Safety Case	A safety case submitted to the CER for acceptance for the purpose of gaining a Production Safety Permit.
Production Safety Permit	A safety permit issued by the CER under 13P of the Act which permits the production activity as set out in the associated Production Safety Case.
Reportable Petroleum Incident	A Reportable Petroleum Incident is an event or occurrence that must be reported to the CER as set out in the Act, <i>Petroleum Safety (Petroleum Incident) Regulations</i> and associated guidance.

Term	Definition or Meaning
Safety (and Environmentally) Critical Elements – S(E)CE	Safety (and Environmental) Critical Elements S(E)CE are such parts of an installation and its plant, including computer programs, a purpose of which is to prevent or limit the effect of a major accident, or the failure of which could cause or contribute substantially to a major accident. The environmental term is only applicable offshore and relates to the definition of a major hazard, which includes major environmental incidents offshore.
Safety (and Environmental) Management System (S(E)MS)	The framework of policies, processes and procedures that enable the operator or owner to manage its risks to safety (and the environment) and continually improve its performance.
Verification Scheme	Denotes the Facilities Verification Scheme and/or the Well Verification Scheme.
Well Verification Scheme	A Well Verification Scheme is a description of the work carried out by an Independent Competent Body(s) to verify whether a operator has identified and continues to meet suitable performance standards for well-related S(E)CEs and that well integrity is maintained.
Well Work Activity	An activity that alters the pressure containment boundary of a well; or introduces wire, cable or pipe into a well. Such an activity requires a Well Work Safety Permit.
Well Work Safety Case	A safety case submitted to the CER for acceptance for the purpose of gaining a Well Work Safety Permit.
Well Work Safety Permit	A safety permit issued by the CER under 13P of the Act which permits the Well Work Activity as per the associated Well Work Safety Case and Non-production Safety Case.

1 Introduction

1.1 *The Petroleum Safety Framework*

The *Electricity Regulation Act 1999*, as amended *inter alia* by the *Petroleum (Exploration and Extraction) Safety Act 2010* and the *Petroleum (Exploration and Extraction) Safety Act 2015* (the Act) gives the Commission for Energy Regulation (CER) responsibility for the safety regulation of petroleum exploration and extraction activities in Ireland. The Act requires the CER to “establish and implement a risk-based Petroleum Safety Framework” (the ‘Framework’). The Framework is the overall system established by the CER to regulate the safety of petroleum activities¹, in particular designated petroleum activities.² The Framework established under the Act is a permitting regime, is goal-setting and risk-based, whereby operators and owners are required to reduce risks to a level that is As Low As is Reasonably Practicable (ALARP).

1.2 *Purpose of the Compliance Assurance System*

Responsibility for the management and control of major accident hazards³ rests with each operator and owner, with primary responsibility for the control of risks of a major accident⁴ associated with the carrying on designated petroleum activities resting with the operator. Each operator and owner must satisfy itself as to the adequacy of, and ensure implementation of, measures to reduce risks to safety to a level that is ALARP. The adequacy of measures must be demonstrated within the operator’s or owner’s safety case. Where the CER accepts a safety case, it will issue a safety permit to the petroleum undertaking. Operators and owners must comply with their accepted safety case and the associated safety permit, as well as their obligations under the Act.

This *Compliance Assurance System* document forms part of the Framework, and must be complied with by petroleum undertakings, operators and owners. The overall purpose of the Compliance Assurance System in the Framework is to measure and ensure compliance by petroleum undertakings, operators and owners with their duties under the Act, their safety case and safety permit (as appropriate) to design, construct, operate and maintain their activities in such a manner as to reduce any safety risk to persons to a level that is ALARP. More specifically, the Compliance Assurance System is the system that defines how operators and owners must carry out verification, report on safety performance and carry out Independent Safety Case Reviews.

The *Compliance Assurance System* document sets out the requirements on operators and owners to:

- Implement a Verification Scheme(s) using ICBs;
- Report on safety performance indicators to the CER on a quarterly basis; and

¹ As defined in section 13A(2) of the Act.

² As defined in the *Petroleum Safety (Designation of Certain Classes of Petroleum Activity) Regulations 2013*.

³ As defined in the 2015 Act: “major accident hazard” means a hazard that if realised could result in a major accident”

⁴ As defined in section 13A of the Act.

- Conduct Independent Safety Case Reviews.

The *Compliance Assurance System* document as part of the Framework is illustrated in Figure 1 on the following page.

1.3 Structure and Interpretation

1.3.1 Structure of the Document

The Compliance Assurance System is comprised of three sections detailing the following requirements upon operators and owners:

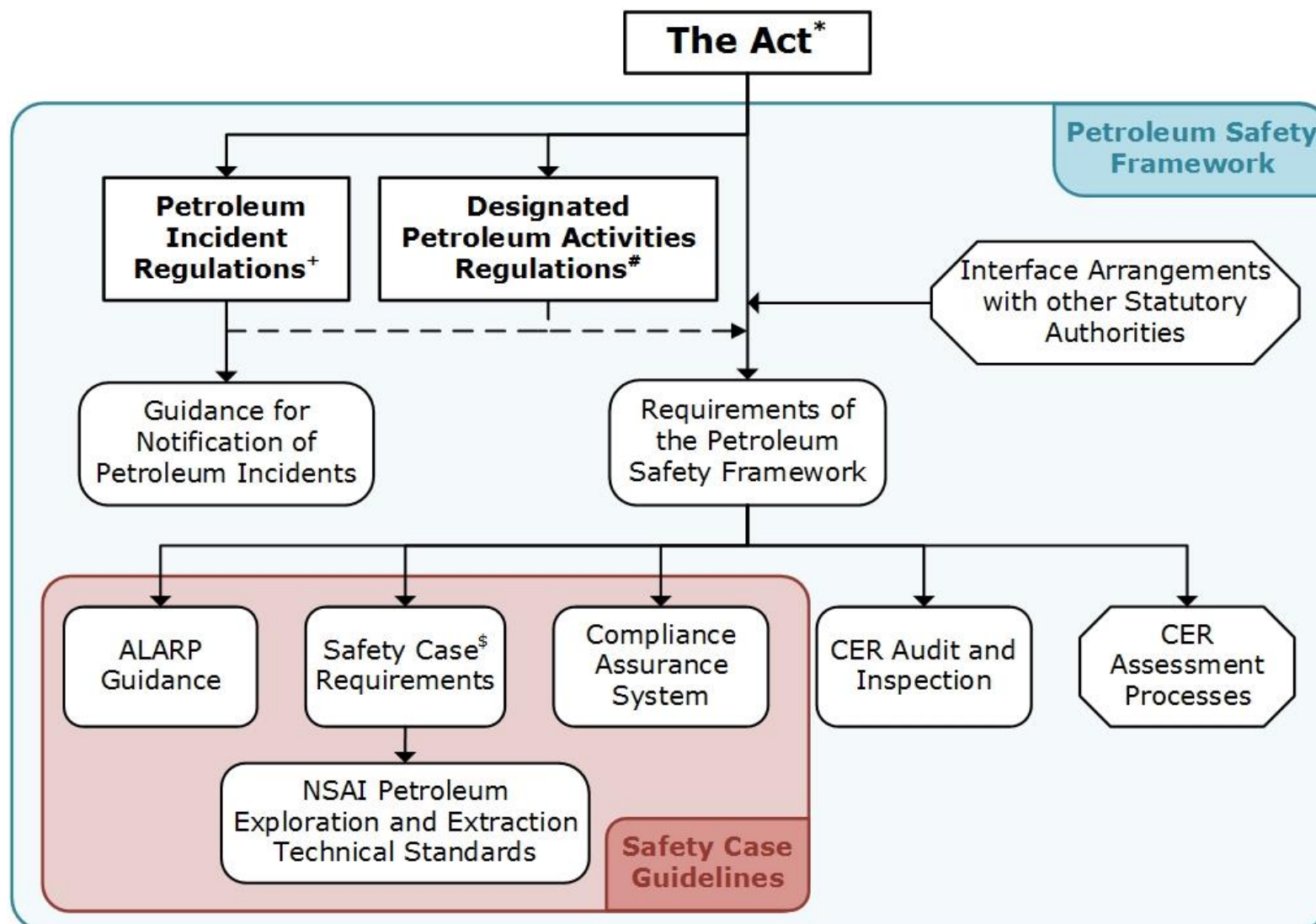
- Verification (section 2);
- Safety Performance Reporting (section 3); and
- Independent Safety Case Review (section 4).

1.3.2 Interpretation

For ease of reference, the CER has summarised certain provisions of the Act in this document. Such summaries are provided for convenience only and are not intended as a substitute for or legal interpretation of the Act and shall not relieve any petroleum undertaking, operator or owner from any obligation under the Act or operate as a defence to any failure to comply with its obligations under the Act.

In accordance with section 13B of the Act, nothing in the Act or within this document shall be read as to be restrictive of any other duty, requirement or obligation imposed by law in respect of safety which would otherwise apply to a petroleum undertaking, operator or owner.

Examples of the application of this Compliance Assurance System are provided in example boxes, which are illustrative only and are included to aid understanding and are not prescriptive or exhaustive. They do however represent the CER's understanding in relation to the subject matter of the example.



(*) The Electricity Regulation Act 1999 as Amended by the PEES Act 2010 and PEES Act 2015

(#) Petroleum Safety (Designation of Certain Classes of Petroleum Activity) Regulations 2013

(+) Petroleum Safety (Petroleum Incident) Regulations 2013

(\$) and notifications

Figure 1: Overview diagram of Petroleum Safety Framework

2 Verification

Not subject to consultation at this time. Section 3 only subject to consultation.

Operators and owners must have in place Verification Schemes for verifying the suitability and performance of Safety (and Environmentally) Critical Elements (SECEs) and the maintenance of well integrity, by one or more organisations, termed Independent Competent Body(s) (ICBs). Verification is required for all petroleum infrastructure related to the carrying on of a designated petroleum activity, including offshore and onshore Facilities, pipelines, wells and for all phases of the petroleum infrastructure's lifecycle.

The operator and owner is required to appoint one or more ICBs, in accordance with the procedure set out in section 2.1 below, to verify the initial (design) and continuing (operations) performance of the S(E)CEs and well integrity. In this regard a:

- Well Verification Scheme must be in place for all wells and all well work; and
- Facilities Verification Scheme must be in place for all petroleum infrastructure that relates to each safety permit and is outside the scope of a Well Verification Scheme.

Verification is carried out by assessing and reviewing a cross-section of the operator's or owner's processes used to define and maintain S(E)CEs and well integrity such that risks are verified to be ALARP. The verification must be such that the ICB is carrying out sufficient verification to be able to judge whether the S(E)CEs are initially and will continue to meet their performance standards, or well integrity will and is being maintained.

A Verification Scheme must give a description of the work to be carried out by an ICB to verify whether the operator or owner meets suitable performance standards for S(E)CEs and maintains well integrity. It is the responsibility of the operator and owner to establish and ensure implementation of their Verification Scheme. The Verification Scheme must, however, be reviewed by the ICB.

The responsibility for ensuring that the ICB carries out verification under the Verification Scheme rests with the operator or owner.

The verification requirements are in addition to the requirement that the safety case must include, *inter alia*, sufficient information to demonstrate that adequate arrangements have been established for monitoring, audit and for the making of reports on safety performance and compliance.⁵

This section of the *Compliance Assurance System* document sets out the specific requirements for:

- Appointment of an ICB by an Operator or Owner (section 2.1);
- Verification Scheme Processes (section 2.2);
- Safety Case Content and Linkage with Safety Permits (section 2.3);
- Facilities Verification Scheme Requirements (section 2.4); and
- Well Verification Scheme Requirements (section 2.5).

⁵ Section 13M(5)(e) of the Act.

2.1 Appointment of an ICB by an Operator or Owner

2.1.1 Competence and Independence

2.1.1.1 Submission to the CER

The operator and owner must submit its choice of ICB(s) to the CER for acceptance. For the ICB(s) that cover the scope of a Well Verification Scheme, or a Facilities Verification Scheme, a single submission must be made in a format defined by the CER⁶ in which the operator or owner must:

- Demonstrate how the entire Verification Scheme will be carried out by the ICB(s);
- Provide confirmation that the ICB is certified to ISO 9001, or provide a demonstration that the ICB operates a quality management system that meets the same goals (for all work under the Verification Scheme);
- Describe how the ICB meets the independence requirements in section 2.1.1.3; and
- Describe any previous and current associations between the operator or owner and the ICB, any potential conflicts of interest and how such issues will be managed.

The CER will accept⁷ or refuse the ICB on the basis of the evidence provided in the submission (see section 2.3.2 in regard to when this needs to be done in relation to submission of an application for a safety permit). The CER will inform the operator or owner as to the outcome of their review of the ICB; this will be as soon as is practicable, but in any event should be no later than four weeks after receipt of the submission.

Re-acceptance of an ICB is not required in relation to the submission of a material change to a safety case, so long as the operator or owner is satisfied that the material change is within the competency of the existing accepted ICB.

Section 2.1.1.2 below gives additional competency guidance that must be met by the ICB. Whilst this information is not required in the submission to the CER for ICB acceptance, the operator or owner must be able to demonstrate at any time that the ICB is continuing to meet these competency requirements.

The operator or owner may appoint more than one ICB to implement a Verification Scheme provided it can demonstrate that the entire content of the Verification Scheme is covered. Further details regarding multiple ICBs are given in section 2.1.2.

The operator or owner may change ICB, subject to the requirement that the proposed choice of ICBs must be submitted to the CER for its prior review and acceptance (see section 2.1.3).

⁶ The appropriate form is provided on the CER website.

⁷ The CER's acceptance in no way relieves the operator or owner of any responsibility under the Act, or of its duty to ensure that verification is carried out by suitably independent and competent persons.

2.1.1.2 Competence Guidance

Guidance is provided in relation to three key components of ICB competency, namely:

- That the ICB has persons with the necessary competence, skill, experience, knowledge and training;
- The system the ICB has in place to manage competency; and
- The work allocation system that the ICB has for ensuring that suitable numbers of competent persons carry out the verification activities required by the Verification Scheme.

Individuals

The ICB must have individuals available to carry out verification with suitable knowledge, experience and training to carry out the tasks allocated to them for the type of petroleum infrastructure being verified. They must have the competence to critically assess the operator's or owner's system for ensuring S(E)CE are suitably designed and operated to meet performance standards that make the risk ALARP. This means that the ICB will need individuals who are competent in design assessments, maintenance systems, or the actual carrying out of maintenance on the petroleum infrastructure such that over all the ICB's individuals all of the technical areas are covered.

Competency System

The ICB must ensure the competency of individuals through procedures to evaluate and manage competency. These procedures must include:

- Job descriptions that state minimum qualifications and minimum experience requirements;
- A definition of the required competence;
- Periodic assessments that evaluate continuing competence and identify on-going training requirements;
- Training records to be made and maintained; and
- A procedure for the selection of persons with competency appropriate to the task. This could take the form of a competency matrix showing the aspects of the Verification Scheme that specific persons are competent to undertake.

Work Allocation System

The range of competencies needed to cover the wells, well-related equipment and the S(E)CEs is extensive. It is expected that multiple technical specialists will be required by the ICB for verification, and that this will take due cognisance of the number of technical specialists the operator or owner requires for its operations.

The ICB(s) must have a work allocation system that ensures that suitable numbers of competent persons carry out work under the Verification Scheme.

2.1.1.3 *Independence*

The ICB's persons carrying out verification activities must:

- Be impartial and free from direct financial or operational pressures, which could affect their judgement;
- Not verify their own work;
- Not be employed directly by the petroleum undertaking, operator or owner (or any constituent member thereof), their parent companies or a company in the same group, and
- Not, if a person is working for a third party company with a safety related relationship; verify the work of that company.

2.1.2 *Multiple ICBs*

Verification may be carried out by more than one ICB provided the operator or owner ensures that the entire content of the Verification Scheme is completed.

Where more than one ICB is appointed, the operator's or owner's **Safety (and Environmental) Management System** must document the interface and communications between all parties, together with clear roles and responsibilities.

2.1.3 *Change of ICB*

In order to change ICB, or add an additional ICB, a new ICB submission must be made to the CER in accordance with section 2.1.1.

The operator or owner must ensure that the following are made available to the incoming ICB (as applicable to their scope of verification):

- The current status of all verification activities;
- The list of open anomalies with the actions and planned closure dates; and
- The list of current verification reservations.

The operator or owner must ensure the accuracy of all records and that continuity of verification activities is maintained through a change of ICB.

2.2 *Verification Scheme Processes*

2.2.1 *Overview of Schemes*

2.2.1.1 *Facilities Verification*

An operator's or owner's Facilities Verification Scheme defines the work and process whereby the ICB verifies that the performance standards for the S(E)CEs are suitably defined and that the S(E)CEs operate to them throughout the lifecycle of the installation. For each performance criterion for each S(E)CE, the Facilities Verification Scheme must define the verification activities that the ICB carries out.

The Facilities Verification Scheme is comprised of the activities carried out by the ICB:

- To verify:
 - The suitability and completeness of the chosen S(E)CEs;
 - The suitability of the performance standards for the S(E)CEs;
 - That the S(E)CEs meet the performance standards from design through on-going operations to ensure risks to persons are ALARP;
- To raise and accept closure of anomalies; and
- To raise verification reservations.

As part of the above, the Facilities Verification Scheme must include review of procedures used to manage the performance of S(E)CEs including, but not limited to, procedures used to:

- Assess the safeguards that may be needed should an S(E)CE fail (often called operational risk assessment);
- Determine under what conditions maintenance can be deferred; and
- Determine maintenance intervals (e.g. risk-based inspection).

Detailed requirements for the Facilities Verification Scheme are given in section 2.4, and Appendix A gives an example list of verification activities, which are aligned to the S(E)CE's performance standard.

2.2.1.2 Well Verification

An operator's Well Verification Scheme defines the work and process whereby the ICB verifies that well integrity is maintained, the performance standards for well-related S(E)CEs are suitably defined and that the S(E)CEs operate to them over the lifecycle of the well. For each performance criterion and for well integrity, the Well Verification Scheme must define the verification activities that the ICB carries out. Topsides equipment (i.e. on the production, or non-production installation⁸) that relates to the well should generally be covered by the Facilities Verification Scheme, though guidance on potential overlap of Verification Schemes is given in Section 2.2.1.3.

The Well Verification Scheme is comprised of the activities carried out by the ICB:

- To verify:
 - Well integrity from design through on-going operations;
 - The suitability and completeness of the chosen well-related S(E)CEs;
 - The suitability of the performance standards for the well-related S(E)CEs;
 - That the well-related S(E)CEs meet the performance standards from design through on-going operations;
- To raise and accept closure of anomalies; and
- To raise verification reservations.

As part of the above, the Well Verification Scheme must include the review of the procedures that are used to manage the performance of well-related S(E)CEs including, but not limited

⁸ As defined in the 2015 Act: "non-production installation" means the class of installation involved in carrying out offshore petroleum exploration or other designated petroleum activity or activities whilst stationed in the licensed area, but does not include installations involved in production of petroleum'.

to, systems to:

- Assess the safeguards that may be needed should an S(E)CE fail (often called operational risk assessment);
- Determine under what conditions maintenance can be deferred;
- Determine maintenance intervals (e.g. risk-based inspection); and
- Provide for dispensation to deviate from a defined well policy, or part of a performance standard (e.g. non operation of a downhole safety valve).

If Well Work Activity is being carried out from a non-production installation, the Well Verification Scheme must include verification of the suitability of the specific combination of the well and non-production installation that is being used for the well work.

Detailed requirements for the Well Verification Scheme are given in section 2.5.

2.2.1.3 *Overlap of Verification Schemes*

There may be an overlap between the Facilities and Well Verification Schemes. To avoid duplication, where appropriate, verification carried out for a Well Verification Scheme may be cited by the operator as part of the Facilities Verification Scheme arrangements and vice versa, provided that there is no gap between them whereby, for example, a part of the well, or an S(E)CE is not covered by any Verification Scheme.

Example

For well work carried out from a non-production installation, an approach to the split between the Facilities and the Well Verification Schemes could include:

- The operation of the mud and BOP is part of the Facilities Verification Scheme;
- The fact that the mud design and BOP is appropriate for the well work being carried out is part of the Well Verification Scheme;
- The fact that the BOP is appropriate for the well is part of the Well Verification Scheme; and
- The casing design is part of the Well Verification Scheme.

2.2.2 *Anomalies and Reservations*

2.2.2.1 *ICB and Operator or Owner Process*

If, in carrying out the Verification Scheme, the ICB determines that the operator or owner is not in compliance with its performance standards, or associated procedures, or will or is not maintaining well integrity (the bulleted lists in the two sections above), the ICB must raise an anomaly,⁹ which is defined as follows:

An **anomaly** is a failure identified by the ICB of either the operator's or owner's system for maintaining well integrity, or the performance of an S(E)CE, or the associated

⁹ This system of raising anomalies does not prevent an ICB from bringing to the attention of the operator or owner any issue needing remedial action, or any improvement that should be considered for implementation that does not constitute an anomaly as soon as is reasonably practicable.

assurance processes, or the Verification Scheme itself, at any point of the lifecycle.

For any anomaly raised, the operator or owner and the ICB must endeavour to agree the required action and the time within which this action must be completed such that the S(E)CE achieves the performance standard, well integrity is maintained or the anomaly is otherwise satisfactorily closed-out. The operator or owner must obtain the ICB's agreement that the planned closure date for rectification of the anomaly is as soon as is reasonably practicable and this may take into account other temporary risk reduction measures that have been put in place. The ICB must assess whether the action taken by the operator or owner to correct or otherwise close-out the anomaly is suitable, but is not responsible for completing the action. If, in executing the action, the operator or owner finds that substantially more work is required to rectify the anomaly, a new action and close-out date can be agreed with the ICB. The operator or owner is responsible for completing the action.

If the ICB and operator or owner cannot agree on a suitable date for the closure of an anomaly, or on whether an anomaly has been suitably closed-out, the ICB must raise a 'verification reservation' to the operator or owner, which is defined as:

A **verification reservation** is raised if the ICB and the operator or owner cannot reach agreement on any part of a Verification Scheme, or on the timescale or action required for close-out of an anomaly.

All verification reservations raised must be notified to the CER by the operator or owner within one week of being issued using the appropriate form¹⁰. For clarity, the requirement to notify the CER of a verification reservation is not satisfied by the safety performance reporting set out in section 3.

2.2.2.2 CER Process

On receipt of a verification reservation from an operator or owner, the CER will identify and notify the action required, if any, by the operator or owner to close the verification reservation. In deciding the appropriate action required, the CER may carry out an inspection or investigation in relation to the verification reservation.

2.2.3 ICB Review of Verification Scheme and Operator or Owner Processes

The ICB must review the Verification Scheme and the operator's or owner's S(E)CEs, performance standards and assurance processes if these:

- Have not previously been in operation on the installation or well;
- Is for a non-production installation coming into Irish jurisdiction; or
- Have been revised for any reason, in which case only the modified part needs review.

The review must cover the suitability of the:

- Chosen set of S(E)CEs;
- Performance standards for these S(E)CEs;
- Assurance (including maintenance, and inspection) routines used by the operator or owner to ensure performance including their frequency;

¹⁰ The appropriate form is provided on the CER website.

- Assurance processes used in the management of S(E)CE performance (e.g. operational risk assessment and deferred maintenance); and
- Verification Scheme itself, which must define suitable review that allows the ICB to make a judgement as to whether the operator or owner is following their own assurance processes for the S(E)CEs from design through to on-going operations.

Notwithstanding this, the ICB must also review the Verification Scheme as they work on it and raise anomalies in relation to it if it does not meet the requirements within this *Compliance Assurance System* document, or is otherwise unsuitable. This is especially important if there is a change in ICB.

If an ICB raises anomaly in relation to any of the five bullets above that the operator or owner does not accept, and the difference of opinion cannot be resolved, a verification reservation must be notified to the CER (section 2.2.2).

2.2.4 ICB Verification Activities

2.2.4.1 Overview

A Verification Scheme must include all of the following:

- Review of design documents used to justify criteria in performance standards;
- Witnessing of tests;
- Visual examination;
- Review of maintenance and inspection records; and
- Review of procedures used in the management of S(E)CEs such as deviations and dispensations.

The verification activities that need to be carried out and their frequency will vary between S(E)CEs, also between different equipment items that make up an S(E)CE, and the well. A suitable sampling approach may be adopted and guidance in relation to this is given in section 2.2.4.2.

2.2.4.2 Sample Size and Frequency of Verification

Verification is carried out by assessing and reviewing a cross-section of the operator's or owner's processes used to define and maintain S(E)CEs and well integrity such that risks are ALARP. Performance standards need to be defined by the operator and owner for each safety critical function of each S(E)CE. Each function does not necessarily require to be verified every year, or every time a operator or owner carries out maintenance on it. The sample size and frequency of reviewing a function of a S(E)CE must be such that the ICB is carrying out sufficient verification over the installation to be able to satisfy itself that the S(E)CE is initially and will continue to meet its performance standard, or well integrity will and is being maintained.

For many S(E)CEs, there are a number of similar, or even identical, components in operation, e.g. gas detectors, pressure safety valves and petroleum-containing pipework. While the operator's or owner's assurance processes must cover all of these components on a regular basis, verification (during operations likely to be witnessing of tests and

examination of maintenance records) only needs to be carried out on a sample of them at a frequency such that the ICB can be satisfied that the components either individually (e.g. PSVs, where each one must operate), or together (e.g. emergency lights, where normally only a proportion need to operate to meet the performance standard) meet the performance standard.

The frequency of verification of a particular function depends on the frequency of the operator's or owner's inspection and maintenance processes that provide assurance to the operator or owner that S(E)CEs are meeting their performance standards, and also varies for different types of verification, as illustrated in the example below. The verification of most performance standards may be by a combination of maintenance record review and visual examination or witnessing of tests, but the allocation between these activities varies for different S(E)CEs.

Example

Pressure safety valves (PSVs) are normally inspected at intervals of between one and six years depending on the past performance and risk associated with non-operation of the PSV. On a typical offshore platform, or onshore site, there are several hundred PSVs meaning that sufficient certainty can be gained that inspection tests are being carried out correctly, and inspection records reflect actual tests, without witnessing all of the tests (which may or may not be carried out on site). The operational part of the Facilities Verification Scheme for PSVs must include at least (numerical values replaced by xx and yy):

- Witness the minimum of xx PSV and yy% of all PSV lift tests (pop tests) each year including, if any exist, some that failed their previous test;
- Annual review of appropriateness of PSV deferred maintenance assessment for minimum of xx PSVs and yy% of total deferrals (or all deferrals if fewer than this exist); and
- Bi-annual review of the operator's or owner's assessment of PSV reliability.

The Verification Scheme must specify the extent of the testing of S(E)CEs, i.e. a sample size. For any verification activity where a sample of records, or components is verified, the same sample must not be not repeatedly verified.

Example

The operator or owner should consider the number of tests on components of an S(E)CE that are required to be witnessed to allow the ICB to make a decision on whether the test is being carried out correctly and that sufficient certainty can be gained that the recorded test results mirror the actual test results. For example:

- A high integrity pressure protection system, preventing the over-pressurisation of a separator, may require the ICB to witness tests of 100% of the system; and
- A fire and gas detection system with many detectors may require the ICB to witness only a proportion of the detector tests (i.e. less than 100% of them).

2.2.4.3 *Records of Verification*

The operator and owner must ensure that there are arrangements in place for making and keeping verification records for the lifetime of the installation showing:

- The ICB's review of the S(E)CEs, performance standards, assurance routines and procedures and Verification Scheme (section 2.2.3);
- Verification activities carried out, such that it is clear what verification that has been carried out on what equipment, documents, or records, regardless of the outcome (i.e. positive reporting of all verification activities, not just when an anomaly is raised);
- The ICB's verification anomalies, including a record of the:
 - Anomaly itself
 - Planned date for closure of any anomaly;
 - ICB's acceptance of the closure of any anomaly; and
- The ICB's verification reservations.

2.2.5 *Non-ICB Activities*

2.2.5.1 *Vessel Classification*

Work done to satisfy vessel classification for mobile, offshore installations under the auspices of the International Maritime Organisation (IMO) may be used to satisfy aspects of a Verification Scheme. The operator or owner must ensure that this work meets the requirements of the Verification Scheme, including suitable records being kept (see section 2.2.4.3), and that the organisation carrying out the work meets all the ICB requirements (see section 2.1). In this instance, the ICB and the operator or owner must agree that the classification organisation meets all of the ICB requirements, including independence from the operator's and owner's assurance activities, and this assessment may be subject to inspection by the CER.

An example relating to vessel classification is given below.

Example

A non-production installation firewater pump test is witnessed by the vessel's classification society and found to meet all of the criteria in the performance standard. The Facilities Verification Scheme also requires an ICB to witness a firewater pump test. If the classification society meets the ICB requirements for this Verification Scheme, then its witnessing of the test will also satisfy this aspect of the Verification Scheme.

Note that this is only possible if the vessel classification activity covers all of the Verification Scheme requirements.

2.2.5.2 *Notified Bodies*

Under the Pressure Equipment Directive (PED) (97/23/EC) and ATEX Workplace Directive (99/92/EC), Notified Bodies check and review a manufacturer's processes such that the manufacturer is able CE mark a product, which confirms that it meets the relevant directive. If the directive is the criteria in the performance standard of an S(E)CE, it is sufficient for the ICB to check the authenticity of the declaration of conformity for the equipment to confirm this

aspect of the performance standard. The operator or owner and ICB must agree that this is a suitable approach to allow the ICB to meet the requirements of the Verification Scheme and make a judgement as to whether the operator's or owner's assurance processes to meet the performance standard are operating as intended.

Example

A criteria in the performance standard for an item of pressure-containing equipment is that it meets the Pressure Equipment Directive (97/23/EC). This can be verified by a review of the declaration of conformity (with the Notified Body's name and number) and a visual inspection of the CE marking. For some equipment items, the Verification Scheme may require additional verification of welding qualifications or witness of pressure strength tests to be carried out by the ICB.

2.2.5.3 Other Code Requirements

Performance standards may include the requirement for equipment to meet a particular code that is recognised as meeting current Good Practice. Verification of this aspect can be by reviewing and confirming the applicability of work undertaken by another third party that meets the ICB requirements in section 2.1. The operator or owner and the ICB must agree that the other party meets the independence requirements for an ICB and, regarding competency, that they are accredited to recognised standards in Ireland (e.g. ISO9010 and ISO17020) that means that they meet the ICB competency requirements for their workscope.

This party does not need to be accepted by the CER, but may be subject to audit and inspection if used in the verification process. This arrangement can only cover verification of adherence to a recognised code in Ireland and so is unlikely to cover all the S(E)CE requirements for a particular S(E)CE.

Two examples are given below where verification can and cannot be carried out by review of another party's work.

Example

The verification that emergency lighting meets a particular code as required by its performance standard can be made through review of documentation from another party (meeting the ICB requirements) that it meets the code.

Verification of the time that the emergency lighting operates needs to be made by the ICB witnessing a test.

Example

The performance standard for a production tree states that it needs to be rated to 10,000psi. This can be verifying that there is a valid third party certification (from a third party that meets the ICB requirements) that states that the production tree is rated as such.

The wing valves in the same production tree need to close in 30s, which must be verified by witnessing of a test during the commissioning process.

2.3 Safety Case Content, Linkage with Safety Permits and Timings

2.3.1 Safety Case Content

Verification Scheme(s) must be described or referenced in the safety case or notification in accordance with Table 1.

Safety Case or Notification	Documentation Requirements for the Verification Schemes
Design Notification	A summary of the Facilities Verification Scheme that will be implemented during design (as per the requirements in sections 2.2.1 and 2.4).
Production Safety Case	The Facilities Verification Scheme and Well Verification Scheme must be included in the safety case and meet the requirements in sections 2.2.1, 2.4 and 2.5. The safety case must state that design and construction Facilities Verification ¹¹ and Well Verification up to production have been completed and summarise the work done to achieve this.
Combined Operations Notification	Any changes to the Facilities Verification Scheme for the production or non-production installation and meet the requirements in sections 2.2.1 and 2.4.
Non-production Safety Case	The Facilities Verification Scheme must be included in the safety case and must meet the requirements in sections 2.2.1 and 2.4. The safety case must state that a process that meets the same aims as design and construction verification has been completed as detailed in section 2.3.4.3 and summarise the work done. If for reasons of practicality this verification work cannot be completed for when the safety case is submitted, it will be subject to an Additional Information Request, which may impact the timescale for safety case assessment. In any event, a Well Work Safety Permit will not be issued until this verification has been completed, information sent to the CER and the submission assessed.
Decommissioning Safety Case	The Facilities Verification Scheme and Well Verification Scheme must be included in the safety case and meet the requirements in sections 2.2.1, 2.4 and 2.5.
Well Work Safety Case	The safety case must include a statement of completion and summary of work carried out to complete the design part of the Well Verification Scheme. The Well Verification Scheme for the Well Work Activity itself in its entirety must be included in the safety case and meet the requirements in sections 2.2.1.2 and 2.5.2.

¹¹ If, for reasons of practicality, this cannot be completed before submission of the safety case, it will be made a condition of the safety permit. It is not required for established petroleum infrastructure. If a Design Notification is not required, this applies to a process that achieves the same aims as design verification (see section 2.4.1).

Table 1: Verification Scheme documentation requirements for the safety case

2.3.2 ICB Submission Timings

2.3.2.1 Design Notification

The ICB submission must be made at the same time as, or before, the Design Notification is submitted to the CER.

2.3.2.2 Well Work Safety Case

The ICB must be accepted by the CER by the time the Well Work Safety Case is submitted.

2.3.2.3 Other Safety Cases

For all other safety cases, the timing of the ICB submission must be made within a timeline that enables a safety permit to be issued; This should not be before the submission of the safety case itself. In exceptional circumstances where this is not possible, as mutually agreed with the CER, acceptance of the ICB will be made a condition of the safety permit.

2.3.3 Production Safety Permit

For a new installation, a Facilities Verification Scheme must apply from four weeks after the time a Design Notification is submitted.¹² From then until a Production Safety Permit is issued, the Facilities Verification Scheme must cover (see section 2.4 for details):

- Design, construction and commissioning (up to the point at which a Production Safety Permit is required).

Once the Production Safety Permit has been issued, the Facilities Verification Scheme must cover all the S(E)CEs and assurance processes that are used in the management of S(E)CE performance (e.g. operational risk assessment and deferred maintenance) for the designated petroleum activities (excluding wells covered under a Well Verification Scheme, but including commissioning activities that require a Production Safety Permit) that are carried out under that safety permit. The requirements of the Facilities Verification Scheme during production are given in section 2.4.3.

A Well Verification Scheme must be in operation for all wells operated under a Production Safety Permit (see section 2.5.3 for details).

The above requirements also apply to mobile installations that are brought into Ireland for production.

Verification must be carried out for all material changes.

¹² Where a Design Notification is not required, this will be from the point at which the Production Safety Case is submitted, with a requirement to show that a process that achieves the same aims as design verification has been successfully completed or will be successfully completed (see section 2.4.1).

2.3.4 Well Work Safety Permit

The verification requirements are split into those for the well itself and those for a non-production installation or Production Installation depending on which type of unit is carrying out the Well Work Activity.

2.3.4.1 In Relation to the Well

Verification of the design of the well (including how it will be drilled), in accordance with the requirements in section 2.5.1, must be completed prior to submission of a Well Work Safety Case and from this point until well abandonment, a Well Verification Scheme must be in operation regardless of the safety permit that the well is being operated under.

Verification must be carried out for all material changes in relation to a well.

A suspended well remains subject to verification under a Well Verification Scheme. The requirements of the Well Verification Scheme during suspension are given in section 2.5.4.

The requirements of the Well Verification Scheme for a Well Work Activity that covers abandonment are given in section 2.5.5.

2.3.4.2 In Relation to a Production Installation

If a Well Work Activity is to be carried out from a Production Installation, the Production Installation will be subject to a Facilities Verification Scheme as detailed in section 2.4.3. The combination of this and the Well Verification Scheme must cover the S(E)CEs relating to the Well Work Activities.

2.3.4.3 In Relation to a Non-production Installation

In the case of a Well work Activity to be carried out from a non-production installation, verification by the ICB before the Well Work Activity commences must include:

- Verification that the chosen set of S(E)CEs and their performance standards (termed initial suitability) are such that the risk from the hazards managed by them is ALARP;
- Verification that the S(E)CEs are capable of meeting their performance standards, which can be carried out by confirmation of successful maintenance or testing, or direct witnessing of tests (for a suitable sample of each S(E)CE). Work done previously (e.g. previous class or flag state surveys for a floating installation) may fulfil some of these requirements; see section 2.2.5 for further guidance;
- Verification that the assurance process for the S(E)CEs are suitable;
- Verification that assurance procedures (e.g. operational risk assessment and deferred maintenance) are suitable; and
- Review of the Facilities Verification Scheme against the requirements of section 2.2.3.

The above verification must be complete before a Well Work Safety Permit can be issued.

An operational Facilities Verification Scheme for the non-production installation, following the guidance in section 2.4.3, must operate from the time the Well Work Activity commences. This is in addition to the requirements for a Well Verification Scheme for the well that the Well Work Activity relates to.

Verification must be carried out for all material changes on a non-production installation.

2.3.5 Decommissioning Safety Permit

In relation to decommissioning, Verification Schemes must be in place while the Decommissioning Safety Permit is in force. It must cover relevant operational aspects and take account of any changes from the verification activities that were carried out during production.

2.4 Facilities Verification Scheme Requirements

An ICB submission for Facilities Verification must be made at the same time as the Design Notification is submitted¹³. Thus, on-going from four weeks after the Design Notification is submitted, the ICB must verify that the design will deliver risks that are ALARP, performance standards for the chosen S(E)CEs are suitable to reduce the risk to ALARP and that the S(E)CEs will be capable of meeting their performance standards when commissioned and on an on-going basis.

The requirements for the Facilities Verification Scheme during design, construction (including commissioning up until the point when a Production Safety Permit is required), and production¹⁴ are given below.

2.4.1 Design

Design covers the process of determining what will be constructed and how it will be operated.

The ICB must verify that the *ALARP Guidance* has been followed with respect to the decisions that have been made as to the choice of S(E)CEs, their performance standards and ALARP consideration of safety critical risk reduction measures. The verification need not repeat the work done by the designer, but it must be in sufficient detail for the ICB to be satisfied that the design will meet these requirements. To do this, the ICB must review a suitable sample of the documentation, calculations etc. that are part of an ALARP demonstration or justification for the chosen performance standards and not merely rely on the reputation, or past experience of the organisation that has carried out the analysis.

¹³ Unless the Design Notification relates to a material change and the approved ICB has independence and competence to verify the work involved with the material change.

¹⁴ The split into these areas is given to aid the description of the requirements, but does not necessarily mean that the Verification Scheme must be split in the same way.

Example

If a tie-back to an offshore installation does not have a subsea isolation valve (SSIV) on the pipeline, the ICB should review the ALARP assessment for this decision and check any risk calculations used in it. If there is an SSIV and it is given a performance standard for maximum allowable time to close, the ICB should verify this time, but it is less likely that this needs to include a review of calculations since reasonable changes in closure time are likely to be less critical than whether a SSIV exists at all.

Example

Petroleum containing pressure vessels are safety critical and, for a sample of the pressure vessels, calculations for the strength would need to be checked such that sufficient certainty in the correctness of them all can be gained. Use of a suitable software package may mean that less checking is needed to gain sufficient certainty. In some instance this may involve repeating calculations.

2.4.2 Construction**2.4.2.1 Overview**

Before a Production Safety Permit is required, the ICB must have verified that each S(E)CE meets its performance standard. This verification may be by a combination of document review (e.g. testing records, technical deviations, close-out packs, etc.) and witnessing (e.g. commissioning tests to demonstrate that performance standards are met). The combination of review, witnessing and examination must be such that the ICB can gain confidence that the S(E)CEs are meeting their performance standard initially. Two examples of the mix of activities that provide this confidence are given below.

Example

Additional emergency lighting is being provided for a new module on an offshore platform. In this case, the verification activities must include at least:

- Through review of procurement records, that the lights meet the code required in the performance standard;
- Once the emergency lights are installed:
 - That they operate for the required time on loss of normal power; and
 - Witness that the lighting levels defined in the performance standard are achieved.

2.4.2.2 Timing

Verification must not be left until the end of the construction process so as to improve the possibility of resolving anomalies satisfactorily and avoiding any tendency to accept the degraded situation that led to the anomaly being raised. Verification must be carried out throughout the construction process from the end of design through to when a Production

Safety Permit is required, including commissioning of those S(E)CEs that can be commissioned without a Production Safety Permit. Verification is likely to be carried out in stages, but the full verification scope must ensure that all the performance criteria defined in the performance standard are verified.

Example

Gas detector locations and their response time (as required by the performance standard) must be verified by witnessing a suitable test once installed in location.

Example

Verification of a new riser ESD valve must include witnessing of:

- Pressure test of the valve at its place of fabrication to determine whether its passing rate meets the performance standard; and
- Test of the time taken for the valve to close once installed on site to determine whether it meets its performance standard.

In order that the ICB identifies anomalies as early as possible, some verification may be carried out at the procurement stage, such as review of a suitable sample of procurement documents (e.g. procurement orders, datasheets and delivery notes, etc). This may prevent an anomaly from only being identified during the commissioning stage when it is more difficult to rectify.

2.4.3 Production

A Facilities Verification Scheme during the production phase must include all of the following:

- Witnessing of tests;
- Visual examination;
- Review of maintenance and inspection records; and
- Review of related assurance procedures (e.g. deferral, operational risk assessment).

Guidance in relation to these methods is given below.

2.4.3.1 Witnessing of Tests

Where S(E)CEs have an active performance standard (e.g. activation of deluge, detection of flammable gas, etc.) the ICB must witness a sample of the operator's or owner's testing of the S(E)CEs. The purpose of witnessing a test is to verify that it is being carried out correctly and that the results recorded are accurately reflected in the maintenance management system in order that sufficient certainty can be gained in the operation of the maintenance management system.

Example

The active performance standards that require the ICB to be physically present to witness tests include, but are not limited to:

- Emergency shutdown valve closure time;
- Emergency shutdown valve leakage rate;
- Fire water pump starting methods;
- Fire water pump flow rate;
- Gas detector response time; and
- Gas detector alarm levels.

2.4.3.2 Visual Examination

Where S(E)CEs have a passive performance standard (e.g. dimensions, quantity, condition, etc) the ICB must visually examine a sample of the S(E)CEs.

Example

Passive performance standards that require the ICB to visually examine the S(E)CE include, but are not limited to:

- Escape routes;
- Emergency exit doors;
- Blast walls; and
- Passive fire protection.

2.4.3.3 Review of Maintenance and Inspection Records

As part of the verification process, the ICB must review the operator's and owner's maintenance and inspection records to confirm that the assurance process is robust and that scheduled maintenance and inspection has been completed on time and in accordance with documented procedures.

As part of checking the records, the ICB must verify that the scheduled maintenance will reveal any failure mode of the S(E)CE such that preventative or remedial action can be carried out by the operator or owner. The ICB must also review the frequency of a particular maintenance activity to ensure that it is appropriate, taking into account as appropriate the:

- Historical failure rate of the equipment; and
- Risk resulting from failure occurring accounting for the level of redundancy against such a failure.

As part of the review of maintenance and inspection records, the ICB must review the application of any procedures that are used to defer maintenance.

The ICB must review that the maintenance and inspection records refer to the as-found condition of the equipment and identify any remedial action that was required to reinstate S(E)CEs or well integrity to meet the required performance standards.

Review of maintenance records must also be carried out in order to verify whether reliability criteria within the performance standards are being met. This is likely to be done on a sample basis (see section 2.2.4.2 for further details).

2.4.3.4 Review of Operational Deviations

The ICB must verify that risk assessments used to justify continued operation with a failed S(E)CE (often termed operational risk assessment or deviation) are suitable and consider:

- The risks associated with the failure of the S(E)CE;
- The impact of deviations or dispensations from the operator's or owner's policies or procedures; and
- How the risk remains ALARP, taking into account any additional risk reduction measures that are implemented.

In verifying this, the ICB must also review whether the operator's or owner's procedures to manage S(E)CE failures and associated deviations or dispensations are adequate.

2.4.4 Decommissioning

The Verification Scheme(s) must take account of any changes from the verification activities that were carried out during production.

Records must be retained after decommissioning, according to the requirements in section 2.2.4.3.

2.5 Well Verification Scheme Requirements

The requirements for the Well Verification Scheme apply to all wells both offshore and onshore, including those wells that have been suspended and are planned to be abandoned.

The emphasis of the Well Verification Scheme is to ensure that the well design and the associated Well Work Activities are appropriate for the geological conditions anticipated and that the use of any pressure control equipment proposed is fit for purpose, in order to eliminate uncontrolled escape of fluids from the well and ensure that risks are ALARP.

The requirements for the Well Verification Scheme during design, Well Work Activities, production, suspension and abandonment¹⁵ are given below. This will include the review of relevant policies and procedures used by the operator and its contractors as far as they affect the well integrity and operation of well-related S(E)CEs.

¹⁵ The split into these areas is given to aid the description of the requirements, but does not necessarily mean that the Verification Scheme must be split in the same way.

2.5.1 *Design*

The ICB must verify the well design including the design of the drilling process for the Well Work Activity. This verification must be by review of design documents (e.g. well engineering drawings, equipment specifications, calculations, datasheets, etc) and may include checking some design calculations. The well and drilling process will be designed within a certain envelope in which the operator has assessed the risk to be ALARP. Verification must cover the range of possibilities within the defined envelope and must confirm that well integrity will be maintained and the S(E)CEs will meet the performance standards such that hazards are managed and risks ALARP.

Specification of suitable well-related S(E)CEs and their performance standards will depend on the well and the well work planned.

Verification must cover all aspects of the well design pertaining to its integrity and S(E)CEs, including a review of at least:

- The assessment and prediction of subsurface conditions to ensure that all relevant information has been considered;
- The casing and cement design and specification;
- The proposed mud properties to ensure that they are suitable to achieve well control;
- Direct pressure and temperature measurement and/or use of predictive methods to verify anticipated geological conditions;
- Pressure testing methods proposed to demonstrate integrity, including their suitability and frequency;
- The design and specification of pressure control equipment, taking into account anticipated subsurface pressure and temperature conditions; and
- How well abandonment will be achieved.

2.5.2 *Well Work Activities*

The ICB must verify that the Well Work Activity is carried out in accordance with the design and the well programme. This verification must be by a combination of review of a suitable sample of documents (e.g. drilling procedures, material certificates of casing, installation procedures, and testing records)¹⁶ and must include, but is not limited to, verification that:

- The material/equipment that is to be placed in the well (e.g. casing) meets the design requirements, which may be carried out by an external party as outlined in section 2.2.5.2 and the requirements of that section also apply here;
- The installation and pressure testing of the well casings and cement to ensure that no leak paths exist;
- The periodic assessment of actual subsurface conditions (e.g. leak-off test, formation integrity test, pore pressure prediction and actual pore pressure measurements using formation evaluation tools) and any consequent changes to the well design are being carried out;
- Well control procedures (including periodic BOP testing and emergency drills) during the Well Work Activity are appropriate; and

¹⁶ Witnessing of the Well Work Activity by the ICB at the well site should be considered.

- The well has been suitably completed by examination of the final pressure containment logs and, as appropriate, handover documentation that signifies the end of the Well Work Activity.

2.5.3 Production

The ICB must verify the operator's process for ensuring operation of S(E)CEs and well integrity is maintained at all times through implementation of a suitable well integrity management system. This must cover all wells, including those that are suspended, and verification of routine operation and maintenance activities for wells that do not fall under the definition of Well Work Activity. This verification must cover at least review of:

- Preventative maintenance of above ground pressure control equipment, condition monitoring, inspection and maintenance of the well completion;
- Inspection and testing of safety critical valves (e.g. subsurface safety valves, gas lift valves, production master valves); and
- Deviations from normal operations.

Verification may be by document review, or witnessing of tests. There must be some witnessing of the operation of safety critical valves (see section 2.2.4 for how this may also be covered by a Facilities Verification Scheme).

2.5.4 Suspension

The ICB must verify the operator's process for monitoring the integrity of any well that is suspended. This verification may be by a review of a suitable sample of documents (e.g. well suspension procedures, review of inspection records or examination of periodic video records).

2.5.5 Abandonment

For the process of abandoning a well, the same verification requirements apply as for any other Well Work Activity.

In addition, the ICB must verify that the well has been suitably sealed so as to permanently maintain its pressure boundary by a review of a suitable sample of documents (e.g. abandonment procedures and records and pressure test results). The ICB must verify that the process for re-pressurisation of all the formations to virgin pressure, potential changes in fluid composition in the wellbore and the deterioration of well over time have been taken into account.

Once a well has been abandoned it will not be subject to verification.

3 Safety Performance Reporting

This section is the subject of this consultation paper

Operators and owners must monitor and report on safety performance.¹⁷ This is in addition to the petroleum incident reporting required under the Act.¹⁸ This safety performance reporting provides the CER with data on each operator's and owner's safety performance on an on-going basis. The CER uses the data to monitor trends, recognise Good Practice and identify areas for audit and inspection. Safety performance reporting assists the CER in monitoring compliance by operators and owners with their obligations under the Act and the Framework, and their compliance with the accepted safety case and the associated safety permit.

Operators carrying on designated petroleum activities, and owners while in Irish jurisdiction, must measure and report safety performance indicators as detailed below to the CER every quarter from the time a safety permit is issued. The CER may also include additional indicators as specific requirements of a safety permit.

The safety performance indicators listed here are additional to any other indicators that operators and owners monitor to assess the adequacy of their own systems.

3.1 Safety Performance Indicators

Safety performance indicators to be reported to the CER include leading and lagging safety performance indicators:

- **Leading safety performance indicators** are produced from active monitoring of risk reduction measures to ensure their continued effectiveness; and
- **Lagging safety performance indicators** relate to incidents as defined in the *Petroleum Safety (Petroleum Incident) Regulations and Guidance for Notification of Incidents*.

Table 2¹⁹ and Table 3 define the safety performance indicators that must be reported to the CER. For events or occurrences for which notification to the CER is required under the Petroleum Safety (Petroleum Incident) Regulations,²⁰ the associated petroleum incident report reference number(s) must be provided in the safety performance report. An incident must be recorded against all relevant safety performance indicators, e.g. a serious injury caused by a worker falling overboard from an offshore Facility would be tallied under safety performance indicators H1 and M.

Table 4 shows the supporting data that must be reported to the CER to enable analysis of data from different operators and owners to be carried out.

In Table 2, a distinction is made between a worker and a non-worker. Persons carrying on an

¹⁷ Section 13L(3)(f) of the Act.

¹⁸ Section 13A(1) of the Act and the *Petroleum Safety (Petroleum Incident) Regulations*.

¹⁹ See the CER *Guidance for Notification of Incidents* for additional guidance on these indicators.

²⁰ Submitting safety performance indicators relating to petroleum incidents does not constitute notification to the CER under the *Petroleum Safety (Petroleum Incident) Regulations*.

activity in relation to the operation or activities of the operator or owner are workers. Any other person (such as visitors to the site that are not engaged in a petroleum activity, or members of the public) is classed as a non-worker.

Section 3.2 describes how the reporting is to be carried out.

ID	Safety Performance Indicator
A1	Number of unintentional releases of ignited gas or petroleum liquid
A2	Number of unintentional releases of not ignited natural gas or evaporated associated gas if mass released $\geq 1\text{kg}$
A3	Number of unintentional releases of not ignited liquid of petroleum hydrocarbon if mass released $\geq 60\text{ kg}$
A4	Number of unintentional releases or escapes of any non-petroleum hazardous substance
B1	Number of blowouts
B2	Number of activations of a blowout prevention or diverter system to control flow of well-fluids
B3	Number of instances of a mechanical failure of any part of a well, whose purpose is to prevent or limit the effect of the unintentional release of fluids from a well or a reservoir being drawn on by a well, or whose failure would cause or contribute to such a release
B4	Number of instances of failure to maintain a planned minimum separation distance between two or more wells
C1	Number of losses or non-availability of S(E)CEs e.g. S(E)CEs not meeting their performance standard, requiring Immediate Remedial Action
C2	Number of losses or non-availability of S(E)CEs e.g. S(E)CEs not meeting their performance standard, not reportable under C1
C3	Number of activations of an S(E)CE
D	Number of instances where Immediate Remedial Action was required as a result of significant loss of structural integrity or loss of station keeping in relation to a mobile installation
E1	Number of potential vessel collisions with any petroleum infrastructure
E2	Number of vessel collisions with any petroleum infrastructure
F1	Number of potential helicopter accidents within the safety zone
F2	Number of helicopter accidents within the safety zone
G1	Number of worker fatalities resulting from a designated petroleum activity

ID	Safety Performance Indicator
G2	Number of non-worker fatalities resulting from a designated petroleum activity
H1	Number of serious injuries to workers resulting from a designated petroleum activity
H2	Number of serious injuries to non-workers resulting from a designated petroleum activity
H3	<p>Number of injuries to workers where:</p> <ul style="list-style-type: none"> the person could not perform all of their normal work activities for more than 3 consecutive days, not including the day of the incident; or treatment at a hospital is required as an inpatient or outpatient
I	Number of evacuations of personnel
J	Number of major environmental incidents
K	Number of uncontrolled fires or explosions
L	Number of instances of a stand-by vessel not bring within its geographical area
M	Number of instances of a person falling into the sea
N	Number of occurrences of mustering on onshore or offshore petroleum infrastructure, other than for planned drills
O	Number of occurrences of detection of hydrogen sulfide in the course of operations at a well or in samples of well-fluids from a well where the presence of hydrogen sulfide in the reservoir being drawn on by the well was not anticipated
P	Number of occurrences of the collapse, overturning, or failure of any load-bearing part of any lift, hoist, crane, or derrick
Q	Number of instances damage to property the ownership of which is held by a person other than the petroleum undertaking operator or owner, or a contractor thereof, concerned
R	Number of occurrences of the dropping of an object that could have resulted in a major accident.
S	Number of instances of a collision by a vehicle, crane or aircraft with any petroleum infrastructure

Table 2: Lagging safety performance indicators

ID	Safety Performance Indicator	Guidance
L1	Number of anomalies raised by ICB(s) in the quarter	Details of the anomalies raised are not required to be reported.
L2	Number of verification anomalies raised by ICB(s) in the quarter	
L3	Number of verification reservations that were not closed-out by the end of the quarter	
L4	Number of S(E)CEs with overdue preventative maintenance at the end of the quarter	For this safety performance indicator, S(E)CEs are counted in terms of discrete items, e.g. if 10 gas detectors have not had planned maintenance completed, 10 is reported.
L5	Number of S(E)CE maintenance hours required to clear any backlog in safety performance indicator L4	
L6	Number of live operational risk assessments at the end of the quarter	
L7	Number of planned emergency drills not carried out within the quarter	

Table 3: Leading safety performance indicators

Description
Total man-hours worked on designated petroleum activities during the quarter
Number of beds on fixed installations
Number of beds on mobile installations

Table 4: Supporting data

3.2 Format and Frequency of Reporting

Operators and owners must submit a Safety Performance Reporting Submission Form or a report that details the required information on the safety performance indicators to the CER in electronic and hard copy format²¹. The report must include a summary narrative on the safety performance indicators for the period covered, for example, giving reasons for the parameter being higher, lower, or similar to previous reporting periods. For Reportable Petroleum Incidents, an incident number must be given that cross-refers to the report made to the CER. The reporting parameters must be given in relation to each safety permit.

With the exception of well work, operators are required to report the safety performance

²¹ The appropriate form is provided on the CER website.

indicators to the CER on a quarterly basis within six weeks of the quarter ending, as in Table 5. Reporting of this data to the CER in these timeframes will be a condition of all safety permits.

Reporting Quarter	Latest Submission Date
1 st January – 31 st March	14 th May
1 st April – 30 th June	14 th August
1 st July – 30 th September	14 th November
1 st October – 31 st December	14 th February

Table 5: Safety performance indicator reporting deadlines

For well work activities, operators and owners are required to report on safety performance indicators to the CER on the date that is 2 weeks following cessation of the Well Work Activity, or at a date specified by the CER.

Operator and owners must ensure that the systems in place for gathering the data for the safety performance indicators are robust. Operators and owners must retain data relevant to the safety performance indicators. The CER may confirm the accuracy of the performance reporting data provided by an operator or owner through audit and inspection²².

²² See CER Audit and Inspection System paper

4 Independent Safety Case Review

Not subject to consultation at this time

Operators and owners must review their safety case(s) in specific circumstances, as described in section 13N(2) of the Act, as follows:

- a) At least every five years;
- b) Whenever such a review is necessary because of new facts or to take account of new technical knowledge about safety matters;
- c) Whenever such a review is necessitated arising from (i) reports relating to audits (ii) reports on safety performance and compliance;
- d) In circumstances where the operator or owner considers it appropriate to do so;
- e) Where the CER issues a notice in writing to a operator or owner requiring it to do so; or
- f) Where a change is made to the safety management system which could significantly affect the ability of the operator or owner to comply with its duty to reduce the risks to ALARP.

Where the review of the safety case is required to meet the obligation to carry out a five yearly review (as at (a) above), or in circumstances where the CER has directed the review (as at (e) above), a operator or owner must direct an Independent Safety Case Review by an organisation termed an Independent Review Body (IRB), according to the requirements of this section of the *Compliance Assurance System* document. The IRB must be accepted by the CER before the review commences.

An Independent Safety Case Review will be a condition of a safety permit.

The safety case is a working document and so must represent current operations at all times. The purpose of an Independent Safety Case Review is to confirm that the:

- Safety case continues to demonstrate that all risks to safety have been reduced to ALARP, in the light of changes in Good Practice, improvements in technology or other advances (e.g. new facts or to take account of new technical knowledge about safety matters);
- **Safety (and Environmental) Management System** is being implemented as it is described in the safety case; and
- Verification processes are being implemented as described in the safety case.

Although the Independent Safety Case Review will necessarily consider past performance, fundamentally it is a forward-looking process, which is intended to allow the operator or owner to review its processes, ensure that its procedures are being fully applied as described in the safety case, and identify any improvements required to the petroleum infrastructure and/or S(E)MS for the risks to safety to remain ALARP.

The intention of the review is not to find issues that would be identified by the operator, owner, or the ICB during the course of their normal business, but to review whether the risk as described in the safety case will be ALARP given changes that have occurred over the preceding five years and may occur over the next five years.

This section of the *Compliance Assurance System* document sets out the requirements to be followed by operators and owners for the Independent Safety Case Review:

- Independent Safety Case Review Timing (section 4.1);
- Appointment of an IRB by an Operator or Owner (section 4.2);
- General Requirements (section 4.3);
- Technical Requirements (section 4.4); and
- Content of the Independent Safety Case Review Report (section 4.5).

4.1 *Independent Safety Case Review Timing*

The operator or owner is responsible for completing the Independent Safety Case Review. For a review instigated by the five yearly process, a review report must be submitted within five years of the last review being accepted by the CER. The example box below illustrates a typical schedule for an operator or owner to complete such a five yearly review. For an Independent Safety Case Review directed by the CER, the timescale in which it must be completed will be specified.

Example

For an Independent Safety Case Review of a Production Safety Case, the review may progress as follows:

- 0–2 months: The operator selects the IRB and submits their choice to the CER;
- 3–8 months: The Independent Safety Case Review takes place and the list of findings is prepared and action close-out dates agreed with the IRB (during this time some actions may be closed-out and, if relevant, may be included in the Independent Safety Case Review report as recent improvements);
- 9–12 months: The Independent Safety Case Review report is prepared and submitted to the CER. The safety case is also updated as a result of the review and goes through the material change process as necessary

4.2 *Appointment of an IRB by an Operator or Owner*

4.2.1 *Submission to the CER*

The Independent Safety Case Review must be carried out by an organisation, or a number of organisations that are competent and independent. Such a body is termed an Independent Review Body (IRB). The IRB(s)²³ must have individuals, who between them have the competencies to complete the requirements defined in this section.

²³ Note that the singular IRB is used in the remainder of this document, but this does not disallow the possibility of the operator or owner to use more than one IRB to cover the required review scope.

Before commencing an Independent Safety Case Review, the operator or owner must submit information relating to their choice of IRB to the CER for acceptance²⁴ using the appropriate form.²⁵ The CER will accept the IRB on the basis of the evidence provided in the submission. The CER will inform the operator or owner whether acceptance is given as soon as is practicable, but in any event no later than four weeks after receipt of the submission.

In the submission, the operator or owner must:

- Provide confirmation that the IRB is certified to ISO 9001, or provide a demonstration that the IRB operates a quality management system that meets the same goals (for all work under the Independent Safety Case Review);
- Describe how the independence of the IRB meets the requirements in section 4.2.3;
- Describe any previous and current associations between the operator or owner and the IRB, any potential conflicts of interest and outline how such issues are managed; and
- If more than one IRB is used, how they cover the required review scope between them.

The CER will accept the operator's or owner's choice of IRB if they meet these criteria.

4.2.2 Competence Guidance

Guidance in relation to two components of competency are given:

- The competence of individuals employed by the IRB; and
- The system the IRB has in place to manage competency.

4.2.2.1 Individuals

Individuals within the IRB that carry out the review must have suitable knowledge, experience and training to be competent to carry out the tasks allocated to them for the type of petroleum infrastructure being assessed.

4.2.2.2 Competency System

The IRB must ensure the competency of individuals through procedures that detail how competency is evaluated and managed. These procedures must include:

- Job descriptions that state minimum qualifications and minimum experience requirements;
- A definition of the required competence;
- Periodic assessments that evaluate continuing competence and identify training requirements;
- Training records to be made and maintained; and
- A procedure for the selection of persons with competency appropriate to the task, which could take the form of a competency matrix showing the aspects of the review that specific persons are competent to undertake.

²⁴ The CER's acceptance in no way relieves the operator or owner of any responsibility under the Act, or of its responsibility to ensure that the Independent Safety Case Review is carried out by suitable independent and competent persons.

²⁵ The appropriate form is provided on the CER website.

4.2.3 *Independence*

The IRB's persons carrying out the review activities must:

- Be impartial and free from direct financial or operational pressures, which could affect their judgement;
- Not review their own work;
- Not be employed directly by the petroleum undertaking, operator or owner (or any constituent member thereof), its parent company or a company in the same group;
- Not, if a person is working for an ICB for the installation being reviewed, review the work of that company; and

Not, if a person is working for a third party company with a safety related relationship review the work of that company.

4.3 *General Requirements*

4.3.1 *Independent Safety Case Review Scope*

The scope of the Independent Safety Case Review must include, but may not be limited to:

- How changes in technology, Good Practice etc. have been reflected in the design and operational parameters of the petroleum infrastructure;
- How maintenance, inspection and testing of S(E)CEs are ensuring that risks are ALARP;
- Whether changes to the petroleum infrastructure have been managed such that the risk is still ALARP;
- Whether there have been any detrimental changes to S(E)CEs or their performance;
- Whether lessons are being learnt from incidents and abnormal or unexpected events;
- How the operator or owner has ensured that the risk continues to be ALARP considering:
 - New knowledge and understanding;
 - Changes to risk assessment techniques and assumptions;
 - Safety critical changes to codes and standards;
 - Further risk reduction measures that must be implemented (see section 4.2.3 of the *ALARP Guidance*; and
- Changes in management of safety and human factor aspects affecting the designated petroleum activities.

4.3.2 *Workforce Involvement*

The workforce, including safety representatives, must be consulted and involved in the Independent Safety Case Review to allow them to identify further risk reduction measures of procedures, systems and hardware for consideration.

The operator or owner, in conjunction with the IRB, must decide how the workforce will be involved in the Independent Safety Case Review. Ways of achieving this include ALARP workshops (see example box below), and/or interviews and observations of working practices at the Facility. It is important that open discussions take place between persons from the IRB and the workforce.

Example

ALARP workshops are structured brainstorming exercises used to identify potential risk reduction measures that are needed to ensure that the risk remains ALARP in light of new technology etc and are a structured opportunity for the workforce to have a positive impact on safety.

ALARP workshops should be arranged to allow onshore and offshore workforce to participate. The workshops should be independently chaired. The scope of the workshop should include discussion of potential improvements to procedures, systems and hardware including those that eliminate, prevent, detect, control and mitigate major accident hazards and may take into account aspects such as:

- The condition of the system;
- Possible improved arrangements on other installations that could be considered on the installation being reviewed;
- Safety performance indicators and trends;
- Incidents that may have been prevented by improved S(E)CEs;
- Changes in operations and conditions;
- Changes to the plant and the process;
- Changes in organisational arrangements;
- Maintenance records indicating the condition of equipment and work to ensure its integrity;
- Audit and inspection reports;
- Changes in Good Practice, including new knowledge and technology;
- The management of human factors; and
- Issues arising due to ageing and obsolescence.

Information from the other parts of the Independent Safety Case Review can be fed into the ALARP workshops to help seed ideas for risk reduction measures.

Any findings that arise from the workforce consultations must be collated for consideration (see section 4.3.3).

4.3.3 Findings and Reservations

4.3.3.1 IRB and Operator or Owner Process

In carrying out the Independent Safety Case Review, the IRB identifies ‘findings’,²⁶ which are defined as follows:

A **finding** is a failure identified by the IRB of either the operator’s or owner’s systems or operations with respect to the safety case and associated documents, or a further risk reduction measure that must be considered, and then potentially implemented, for the risk to remain ALARP.

Where a finding is raised, a response by the operator or owner is required, and action must

²⁶ This system should not prevent an IRB from bringing to the attention of the operator or owner any issue that they identify and consider needs remedial action, or is an improvement that should be considered for implementation as soon as possible.

be considered, and potentially taken by it to close the finding.

Identification of findings are the main focus of the Independent Safety Case Review. For any finding raised, the operator or owner and IRB must agree the action required to close out the finding, which will be by:

- Completion of a suitable change to a hardware or procedural system or similar; or
- An assessment to determine whether an additional risk reduction measure identified in the finding is needed for the risk to remain ALARP.

The operator or owner must obtain the IRB's agreement on the planned action for each finding and their closure date, which must be as soon as is reasonably practicable. The operator or owner is responsible for completing the work identified in the action.

Where a finding is closed-out by the operator or owner carrying out a technical assessment, that assessment may result in an action (i.e. a change made to a hardware or procedural system or similar). If the result of the technical assessment is not known when the Independent Safety Review is concluded, then the timescale for completion of this action does not need to be agreed by the IRB.

If the IRB and the operator or owner cannot agree on a suitable date for an action to close a finding, or on whether the action, or finding is suitable, the IRB must raise a 'review reservation', which is defined as follows:

A **review reservation** is raised if the IRB and the operator or owner cannot reach agreement on the validity of a finding, or on the timescale or action required for close-out of a finding.

Review reservations are included within the Independent Safety Case Review report, which is sent to the CER. The CER process for dealing with review reservations is given in section 4.3.3.2.

An example of the possible workflow is given below with two possible close-out Scenarios and a review reservation Scenario.

Example

Finding: The gas detection layout was defined before line-of-sight gas detector technology became developed enough to be used reliably. It is not known if the risk of fire and explosion is ALARP as there are no line-of-sight detectors on the Facility.

The operator and IRB agree that the finding should be closed-out (barring any remedial work) within X months of the completion of the Independent Safety Case Review.

- *Close-out Scenario A:* The operator carries out a gas detector layout assessment taking account of all available technologies and the need to meet current Good Practice and for the risk to be ALARP. It shows that the current arrangement is ALARP as additional line-of-sight gas detectors provide little benefit.

- *Close-out Scenario B:* The operator carries a gas detector layout assessment and determines that additional detectors are needed. These are installed X months later and are the subject of a CER inspection.

Review Reservation: The operator and IRB cannot agree on the date for the finding to be closed-out. This is raised as a review reservation in the Independent Safety Case Review Report.

4.3.3.2 CER Process

On receipt of an Independent Safety Case Review report containing a review reservation from a operator or owner, the CER will identify and notify the action required, if any, by the operator or owner to be able to close the review reservation. The CER may undertake inspection in relation to the review reservation.

4.4 Technical Requirements

The operator or owner is responsible for ensuring that the Independent Safety Case Review is thorough. The intention of the review is not to find issues that would be identified by the operator or owner, or the ICB during the course of their normal business, but to review whether the risk as described in the safety case will be ALARP given changes that have occurred over the preceding five years and may occur over the next five years. Guidance on the CER's expectations for this are given below.

Example

The Independent Safety Case Review is not intended to record individual failures such as the failure of an emergency light, but to identify systemic failures in either the ICB's verification, the operator's assurance activities, or to identify that new, better lighting technology exists and should be considered.

4.4.1 Management Systems Review

4.4.1.1 Operation of the Safety (and Environmental) Management System

The S(E)MS must be reviewed to confirm it remains suitable, including a review of actual practices onshore and offshore to:

- Check alignment with the safety case text and referenced supporting documents; and
- Determine whether improvement can be made to the processes.

The S(E)MS review must be thorough and may consider the suitability and application of the:

- Safety policy, i.e. that it is clear how the safety case aligns and implements the policy;
- Safety organisation:
 - The organisation structure, individual accountabilities and responsibilities, need to be reviewed to determine whether each is adequate in terms of safety management and are an accurate reflection of current arrangements. The

review should consider offshore and onshore arrangements, long-term contractors and interfaces;

- Staffing levels, working hours, shift and crew handovers and deputisation arrangements. This includes confirming that staffing (persons on board) is provided at a level that does not require significant extra hours to be worked, that safety critical information is correctly conveyed during handovers and that arrangements for deputising key persons are clear to those involved;
- Communication and workforce involvement in safety, e.g. meetings, toolbox talks, safety awareness initiatives, safety surveys, safety notices etc; and
- Competence management, e.g. reviewing company information to confirm that persons carrying out safety critical work are and have been assessed as competent.
- Planning and implementation:
 - Safe control of operations including that tasks are scheduled and completed by competent persons;
 - Operational/task risk assessments, i.e. review of records and practices for compliance with applicable procedures and guidance;
 - Management of change to ensure the process is robust and correctly implemented (see section 4.4.1.2); and
 - Control and update of documentation, e.g. the currency of the safety case itself, process and instrumentation diagrams following modifications, etc.
- Safety performance monitoring:
 - Review of arrangements to detect weaknesses in the S(E)MS that need to be resolved, e.g. unsafe conditions, safety inspections, equipment failures, asset integrity statistics, deferred maintenance etc. The focus should be on safety performance indicators relating to major accident hazards and be beyond those required under Safety Performance Reporting in section 3;
 - Analysis of incidents reported since the last review in order to establish that lessons have been learnt, covering:
 - A suitable sample of incident reports to determine whether:
 - The incident's severity classification was appropriate;
 - The immediate cause was identified robustly;
 - Root cause analysis was carried out where required;
 - Actions prescribed as a consequence of the incident are comprehensive, appropriate and completed according to agreed close-out date; and
 - That multiple incidents and underlying trends are being monitored.
 - Confirmation that lessons learnt are effectively communicated to the workforce; and
 - Analysis of audits and reviews of the S(E)MS, including planning of audits, implementation, tracking and closure of actions. The analysis should check the quality and thoroughness of the audits and reviews and that any actions have been fully completed prior to close-out or an adequate explanation for why not recorded. Evidence of a lack of consensus between the auditor and the person responsible for the action should also be looked for and considered.

4.4.1.2 Management of Change

A suitable sample of the changes made to the petroleum infrastructure in the past five years must be reviewed to ensure that a robust process for management of change, including design approval and close-out is being implemented.

4.4.1.3 Human Factors

The review must cover human factors issues in order to gauge whether they are being appropriately managed. The IRB should consider the following for review:

- Managing human failures (e.g. through risk assessment and incident investigation);
- Procedures (e.g. review of a sample of procedures to determine how well they support persons carrying out work);
- Training and competence (e.g. determine whether safety responsibilities and tasks align with competence assurance arrangements, review of training provided, including building on the job experience);
- Staffing (e.g. staffing levels, workload, supervision and contractors);
- Organisational change;
- Safety critical communications (e.g. shift handover and permit to work);
- Human factors in design (e.g. control rooms, human computer interaction, alarm management, lighting, thermal comfort, noise and vibration);
- Fatigue and shiftwork;
- Safety culture (e.g. behavioural safety and learning organisations); and
- Maintenance, inspection and testing (e.g. maintenance error).

4.4.2 Operation of the Verification Schemes

The operation of the Facilities Verification Scheme and Well Verification Scheme must be reviewed to identify any improvements in the verification process. The review must consider the suitability of the performance standards and their contents for a suitable sample of S(E)CEs and, for the Verification Scheme(s):

- ICB's verification anomalies that have been raised including their close-out;
- ICB's verification reservations that have been raised;
- Communication between the operator or owner and the ICB(s);
- Audits of the ICB by the operator or owner; and
- Completion of the verification activities, including a review of sampling.

4.4.3 Consideration of Petroleum Infrastructure Ageing

Petroleum infrastructure ageing must be considered (where appropriate) as part of the review, including obsolescence and life extension issues for at least structural integrity, petroleum containment, controls and instrumentation, and other S(E)CEs that may suffer degraded performance due to ageing.

The review must consider whether:

- There are robust structural, pipeline and process integrity management systems in place that account for ageing and possible life extension;
- Suitable fabric maintenance of process equipment and the structures is being carried out;

- Integrity management efforts are not solely being concentrated on current and near future threats, as petroleum infrastructure needs long term plans to address ageing and life extension if it is to operate for an extended period.
- Ageing and life extension are being explicitly addressed in the safety case; and
- Suitable periodic integrity management audits are being performed to aid in the formulation of ageing and life extension protocols.

4.4.4 Review of the ALARP Demonstration

The Independent Safety Case Review must include a review of the ALARP demonstration in the safety case (see section 9 and 10 of the *Safety Case Requirements*, and the *ALARP Guidance*). The review must include assessment of whether the following are still current and assessed using current Good Practice:

- Techniques used to identify hazards and determine risks;
- Hazards and risk reduction measures;
- QRA to ensure that the risk from the petroleum infrastructure is accurately represented, including:
 - The data used in the QRA to represent operating conditions of the petroleum infrastructure and that used in calculating the cumulative risk, such as historical failure data;
 - A comparison of the leak data with the operator's or owner's experience; and
 - Assumptions are documented and justified.
- Risk reduction measure not deemed reasonably practicable to implement.

4.5 Content of the Independent Safety Case Review Report

The Independent Safety Case Review report, which is submitted to the CER by the operator or owner using the appropriate form,²⁷ must contain the following information:

- The names of everyone involved in the Independent Safety Case Review including those who led it and those who carried it out;
- How the review was carried out;
- The dates during which the review took place;
- Details of workforce involvement, including consultation with the safety representatives; and
- A demonstration that the review process is robust and independent of the operator or owner.

The Independent Safety Case Review report must demonstrate that the operator or owner met the requirements given in section 4.3 and 4.4.

The report should contain the list of:

- Findings, where an action is still under consideration, including the method by which the action will be closed-out; and
- Findings that will be closed-out by completion of any action, and details of the action itself.

All the findings, and all the risk reduction measures considered but found not to be

²⁷ The appropriate form is provided on the CER website.

reasonably practicable to implement, or closed-out during the review, do not need to be included. However these should be recorded and retained by the operator or owner as the CER may inspect these at a later date. Any review reservations raised by the Independent Safety Case Reviewer must also be included.

The report must also summarise any revisions made, or intended to be made, to the safety case as a result of the review.

If a material change is made to the safety case as a result of the review, then the safety case must be resubmitted to the CER for acceptance as per any other material change.

Appendix A. Example Operational Performance Standard and Facilities Verification Scheme

Note that in the example below some numerical criteria have been replaced by XXX.

S(E)CE: 001 FIREWATER PUMPS							
GOAL To provide firewater for fire protection systems.							
Extent of System <ul style="list-style-type: none">Firewater pumpsFirewater Pump EnclosuresDiesel Day Tanks				Interfaces <ul style="list-style-type: none">Fire and Gas SystemEmergency Shutdown SystemFirewater RingmainFirewater SystemFoam Systems			
FUNCTIONALITY							
ID	Performance Criteria	Basis for Performance Criteria	Assurance of Performance Criteria	Verification			
				Activity	Phase	Sample Size	Frequency
F1	Three x 100% capacity firewater pumps each fed from a dedicated diesel tank Each fire pump to deliver a minimum acceptance flow of xxxxm ³ /hour at xxx barg	Basis of Design for firewater (including ALARP Demonstration) Hydraulic analysis report for firewater system NFPA 20 Centrifugal Fire Pumps Fire Protection Philosophy.	Design and testing during commissioning Subsequent modifications to the firewater hydraulic analysis or firewater pumps and ancillary equipment will be subject to the Change Control Procedures.	F1.1 Review design and modification records to confirm initial suitability and management of change procedure has been followed, including update of assurance and verification activities associated with modifications.	Design	100%	Initial suitability and on modification
			Planned maintenance activities for the firewater pumps are scheduled in MMS and are carried out in accordance with: PMRs FP1234-8	F1.2 Witness performance test of fire water pumps.	Operational	1 Firewater pump	12 m
				F1.3 Review firewater pump safety critical maintenance for previous 12 months	Operational	100%	12 m

F2	<p>Firewater pumps to be capable of being started by all of the following means:</p> <p>All firepumps:</p> <ul style="list-style-type: none"> • have two independent means • manually from the local control panel. <p>Duty firewater pump</p> <ul style="list-style-type: none"> • Automatically via the DCS in accordance with cause and effects. • If firewater ringmain pressure falls below xxx barg. <p>Standby firewater pump</p> <ul style="list-style-type: none"> • Automatically on failure to start the duty firewater pump. 	NFPA 20 Centrifugal Fire Pumps	Left blank in example				
F3	Each firewater pump to be provided with at least xx hours diesel fuel capacity at full load	<p>Basis of Design for firewater (including ALARP Demonstration)</p> <p>Fire Protection Philosophy.</p>	Left blank in example				
F4	Firepump status to be monitored and indicated/annunciated in CCR	<p>NFPA 20 Centrifugal Fire Pumps</p> <p>Control Philosophy</p>	Left blank in example				
F5	All firewater pumps to be configured to be allowed to run to destruction	Basis of Design for firewater (including ALARP Demonstration)	Left blank in example				

AVAILABILITY							
ID	Performance Criteria	References	Assurance	Verification			
				Activity	Phase	Sample Size	Frequency
A1	At least 2 Firewater pump to be available at all times	n/a	PMRs as F1 to F7 above Operational risk assessments for any reduced availability of firewater pumps	<u>A1.1</u> Review Operational Risk Assessments to determine whether unavailability of any firewater pump is managed	Operational	100%	12 m
RELIABILITY							
ID	Performance Criteria	References	Assurance	Verification			
				Activity	Phase	Sample Size	Frequency
A1		Firewater system reliability study	Review maintenance records to determine reliability of the firewater pumps PMRs 1,2,3,4,5,6	<u>A1.1</u> Review of the firewater pumps reliability assessment to determine if undertaken correctly.	Operational	100%	12 m
SURVIVABILITY							
ID	Performance Criteria	References	Assurance	Verification			
				Activity	Phase	Sample Size	Frequency
S1	Location of firewater pumps to minimise the potential for damage due to impacts, dropped objects, explosion and environmental conditions.	Passive Fire Protection Layout Drawings. Fire and Explosion Risk Analysis Dropped Objects Study -	Assurance by design and Management of Change.	<u>S1.1</u> Review design documents to ensure each firewater pump and day tank are protected from dropped objects, explosion overpressures and environmental conditions by location.	Design	100%	Initial suitability and on modification