The UK Nuclear Industry Guide to:

The Periodic Review of Leadership and Management for Safety

Revision History

Issue Number	Revision Date	Changes
Issue 1	July 2017	First Issue

It is recognised that – through experience of using this Guide – there may be comments, questions and suggestions regarding its contents.

In the first instance, any such comments should be sent to the following:
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Executive Summary

The Safety Case Forum is tasked with the standardisation of approach to, and cost- effective delivery of, fit for purpose safety cases, delivered to time, quality and cost, at all stages of a facility's life cycle, and for all processes within that life cycle including any interim, continual and periodic safety reviews, allowing for the safe and efficient operation of nuclear facilities.

This Guide is intended to help Senior Management across the industry in appointing and planning a Periodic Review of Leadership and Management for Safety (LMfS), and to offer guidance to the reviewer(s) on what good LMfS looks like, and how a review ought to be structured.

A Periodic Review of LMfS needs to be tailored in both breadth and depth to the organisation being reviewed, be it single site or multiple site/facilities, and to the severity of risk from each of these facilities. Review of organisational LMfS at a corporate level needs to be integrated with other normal business activities reviewing the implementation of related processes, procedures and instructions.

The Senior Management Team should appoint a reviewer, or review team, bearing in mind that they should have suitable knowledge and experience of the broad areas of leadership, capable organisation, decision-making and learning in accordance with the ONR Safety Assessment Principles (SAPs) for LMfS [Ref 1]. The reviewer/s must be able to interact at all levels within the organisation, and have the gravitas to present any challenging findings to the Senior Management Team. A team should be identified within the organisation to support the review.

This Guide looks at some of the common features found in various standards and publications relating to different aspects of good LMfS including the maturity of the organisation's safety culture. The ONR's SAPs group these aspects into four key principles [Ref 1]: Leadership, Capable Organisation, Decision Making and Learning from Experience. This guide uses the ONR grouping of criteria to provide a structure for a review, assessing both the intent of the organisation and the implementation of that intent in meeting relevant criteria. This guide also encompasses the SDF Leadership and Management for Safety Principles.

Suggestions are presented for physical evidence that can be used in the review, observations that can be made of different activities and behaviours, and questions that can be asked to determine both the effectiveness of the safety management system and the depth of understanding by personnel. Key roles within the organisation and work areas are listed, as well as forms of questions that could be used, and behaviours to look/listen for.

The reviewer(s) should collect evidence and rate performance in relation to, and with reference to, the organisation's Leadership and Management objectives. Shortfalls should be identified and categorised. Findings should then be fed back to the Senior Management Team and actions identified. A review of the cumulative effects of the shortfalls will support appropriate prioritisation of implementation of any identified actions.

The requirements for verification and independent review are also discussed briefly. The appendices include an example of the method for a review used at RSRL (undertaken by Greenwood Berman) and some key learning points from an extensive review undertaken by BAE Systems.

Safety Directors' Forum

In a sector where safety, security and the protection of the environment is, and must always be the number one priority, the Safety Directors' Forum (SDF) plays a crucial role in bringing together senior level nuclear executives to:

- Promote learning;
- Agree strategy on key issues facing the industry;
- Provide a network within the industry (including with government and regulators) and external to the industry;
- Provide an industry input to new developments in the industry; and,
- To ensure that the industry stays on its path of continuous improvement.

It also looks to identify key strategic challenges facing the industry in the fields of environment, health, safety, quality safeguards and security (EHSQ&S) and resolve them, often through working with the UK regulators and DECC, both of whom SDF meets twice yearly. The SDF members represent every part of the fuel cycle from fuel manufacture, through generation to reprocessing and waste treatment, including research, design, new build, decommissioning and care and maintenance. The Forum also has members who represent the Ministry of Defence nuclear operations, as well as "smaller licensees" such as universities and pharmaceutical companies. With over 25 members from every site licence company in the UK, every MoD authorised site, and organisations which are planning to become site licensees, the SDF represents a vast pool of knowledge and experience which has made it a key consultee for Government and regulators on new legislation and regulation.

The Forum has a strong focus on improvement across the industry. It has in place a number of subject-specific sub-groups looking in detail at issues such as radiological protection, human performance, learning from experience and the implementation of the new regulatory framework for security (NORMS). Such sub-groups have developed a number of Codes of Practice which have been adopted by the industry.

SDF Codes of Practice and Guides are available on this link:
http://www.nuclearinst.com/Publications

Safety Case Forum

This Guide has been produced by the Periodic Review Forum, a workstream of the Safety Case Forum, which is in turn a sub-group of the Safety Directors' Forum.

The Safety Case Forum was established in June 2012 and brings together a wide range of representatives of nuclear operators, from all the Licensees and Authorisees across the United Kingdom, including:

- Civil, commercial and defence activities;
- Design, operation and decommissioning of nuclear facilities;
- Research facilities.

The purpose of the Safety Case Forum is to provide guidance that is useful to, and will benefit the widest possible range of UK nuclear operators.

Such guidance is not mandatory, nor does it seek to identify minimum standards. It aims to provide a tool kit of methods and processes that nuclear operators can use if appropriate to their sites and facilities.

These guides are intended to improve the standardisation of approach to the delivery of fit-for-purpose safety cases, while improving quality and reducing the cost of production. They are designed to cater for all stages of a facility's life cycle and for all processes within that life cycle. This includes any interim, continuous and periodic safety reviews, allowing for the safe and efficient operation of nuclear facilities.

When using the information contained within these guides, the role of the Intelligent Customer shall always remain with the individual nuclear operator, which shall retain responsibility for justifying the arguments in their respective Safety Cases. The Office for Nuclear Regulation and the Defence Nuclear Safety Regulator are consultative members of the Safety Case Forum.

The following companies and organisations are participating members of the Safety Case Forum:

SCF Codes of Practice and Guides are available on this link:
http://www.nuclearinst.com/SDF-safety-cases

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Disclaimer

This UK Nuclear Industry Guide has been prepared on behalf of the Safety Directors' Forum by a Technical Working Group. Statements and technical information contained in this Guide are believed to be accurate at the time of writing. However, it may not be accurate, complete, up to date or applicable to the circumstances of any particular case. This Guide is not a standard, specification or regulation, nor a Code of Practice and should not be read as such. We shall not be liable for any direct, indirect, special, punitive or consequential damages or loss whether in statute, contract, negligence or otherwise, arising out of or in connection with the use of information within this UK Nuclear Industry Guide.

This guide is produced by the Nuclear Industry. It is not prescriptive but offers guidance and in some cases a toolbox of methods and techniques that can be used to demonstrate compliance with regulatory requirements and approaches.

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Introduction

Aims

There is a requirement under the Office for Nuclear Regulation (ONR) Fundamental Safety Assessment Principle FP.1 [Ref 1] that effective leadership and management for safety must be established and sustained in organisations concerned with, and facilities and activities that give rise to, radiation risks.

ONR Inspectors make regulatory judgements on the adequacy of compliance and the safety of facilities based on the Periodic Review of Safety required under Licence Condition 15 [Ref 2], one section of which is a review of Leadership and Management for Safety (LMfS) [Ref 3].

The Defence Nuclear Safety Regulator (DSNR) have an analogous Authorisation Condition, AC15, which requires periodic review of safety cases, including safety management and organisation [Ref 4, 5].

The purpose of the Periodic Review is to establish [Ref 3]:

- The extent to which the nuclear facility and the safety case conform to modern standards and good practices, including demonstration that risks are ALARP.
- The extent to which the safety documentation, including the licensing basis, remains valid.
- The adequacy of the arrangements in place to maintain safety until the next Periodic Review or the end of life.
- The provision of adequate capability and resource in terms of the nuclear baseline for safe operation of the facilities, and
- Safety improvements to be implemented to resolve safety issues.

Investigations of high profile events in the nuclear and other high hazard industries have identified common organisational failures in the areas of LMfS, for example Fukushima, BP Deepwater Horizon, Nimrod, Columbia, Buncefield and the Waste Isolation Pilot Plant (WIPP, New Mexico) [References 6-12]. Areas of concern include:

- Leadership
- Operational attitudes and behaviour
- Business environment
- Competence
- Oversight
- Organisational learning, and
- Use of contractors.

Although the Periodic Review of the Safety Case and safety documentation encompasses review of LMfS, these areas have not been routinely reviewed or assessed, as the traditional approach has focused on the more technical aspects of nuclear safety cases. There is uncertainty across the nuclear industry about the approach needed to review LMfS. Currently there are very few exemplars of Periodic Review for LMfS.

This guide attempts to clarify and aid the consistency of approach across the UK nuclear industry. It attempts to identify good practice, and to provide a basis for comparison in order to aid benchmarking across the industry.

It is recognised that a Periodic Review provides a snapshot, albeit a forward looking snapshot, and that changes in leadership personnel can have a significant effect on attitudes and behaviours – the safety culture – of the organisation.

A glossary is included at the end of this Guide.

Scope

This Guide seeks to help define the approach needed in undertaking a Periodic Review of LMfS in terms of the factors to consider in deciding the review structure, skill sets and SQEP requirements of reviewers, criteria against which to judge good practice, possible sources of evidence, interfaces, outputs, and verification requirements for the review.

Terminology

The ONR's SAPs refers to the leadership of a nuclear organisation 'achieving and sustaining high standards of safety and…delivering the characteristics of a high reliability organisation', MS.1 [Ref 1]. A high reliability organisation (HRO) is one in which failure may have far-reaching, potentially catastrophic consequences. The characteristics of highly reliability organisations are described in [Ref 13] and are summarised as:

- Mindful leadership: having a 'safety–production' balance, engagement with front-line staff, investment of resources, upward communication of bad news and proactive audits.
- Problem anticipation: a pre-occupation with possible failure including an acute sensitivity to operations, and a reluctance to simplify an interpretation of events.
- Containment of unexpected events: by means of redundancy of equipment and skills, training and competence, procedures for the unexpected events and deference to expertise.
- Learning orientation: continuous technical training, open communication, analysis of accidents and incidents, and review of procedures in line with the knowledge base.
- Just culture: individual accountancy, open discussion of errors and reporting of problems, and the ability to abandon work on safety grounds.

Application/Readers Guide

This Guide is written for members of the Senior Management Team (see 'Guiding Principles/Concepts' below) responsible for planning a Periodic Review of LMfS, and for the Lead Reviewer and Review Team members.

Each review must be tailored to the organisation being reviewed taking into consideration its size and the complexity of its organisational structure, activities, stage of life-cycle and associated risks. The review of LMfS forms part of the overall Periodic Safety Review, and it may be appropriate to design the review to be consistent with other aspects of the Periodic Review, bearing in mind the interfaces between areas of the review.

Relevant Legislation

This document has been generated giving due consideration to relevant health and safety legislation. Where appropriate, legislation has been referenced, but the primary legislation that has influenced this document is:

- The Health and Safety at Work Act 1974 [Ref 14]
- Management of Health and Safety at Work Regulations (1999) [Ref 15]
- The Energy Act 2013 [Ref 16]
- The Nuclear Installations Act 1965 [Ref 17]
- Corporate Manslaughter and Corporate Homicide Act 2007 [Ref 18]

This is supported by the legally binding ONR's Site Licence Conditions [Ref 19], and/or the DNSR's Authorisation Conditions [Ref 4, 5] as applicable.

Guiding Principles/Concepts

A review of LMfS should be proportionate in both breadth and depth to the level of risk and the stage of lifecycle associated with the facility being reviewed. The review will be much more demanding for an operational plant and less demanding for a facility approaching the end of decommissioning.

The review for multi-facility sites or multiple sites need to be planned and co-ordinated.

- A review at corporate level will establish the organisational LMfS, whereas a review at an individual site or facility would determine how the corporate LMfS is being implemented locally, taking account of local differences in arrangements and culture.
- Where the company's facilities are covered by more than one safety case there is a need to consider LMfS for the full scope of the organisation, for individual facilities, and for the interactions at different levels and between areas of the organisation These reviews should be co-ordinated as part of an overall plan.
- The review should be tailored to the roles and responsibilities of the leadership at the management level being reviewed within the organisation. For a review at the Corporate level this may be the Board or Executive Team, whereas it would be the Site Senior Management Team at an individual Site level, or a Facility Management Team for a review at the Facility level. This Guide uses the term 'Senior Management Team' to mean the senior leadership team with the responsibility and capability to affect behaviours within the area of the review.

Setting up a Periodic Review of LMfS

The Periodic Review is typically done at ten-year intervals, although with agreement of the regulator it may be more appropriate for it to tie in with particular phases of plant operation or plant life. It may also be programmed on a continual basis. The reviews for multi-facility sites or multiple sites need to be planned and co-ordinated as described above.

To maximise the effectiveness of a LMfS review, ideally the reviewer(s) should be selected with the following in mind:

- The LMfS principles cover the broad areas of leadership, capable organisation, decision making and learning. The reviewer(s) should have suitable knowledge of these areas, or be able to access support from the organisation that has the relevant knowledge and experience in these areas.
- Due to the broad areas covered, it is likely that the reviewer(s) will be from within the organisation, unless an external person is identified with suitable qualifications and experience. There are benefits in having both: an external reviewer brings challenge and an independent viewpoint, whereas an internal reviewer provides clarity of local arrangements and ownership of the review and its outcomes.
- The reviewer(s) must be able to interact readily with all different functions and levels within the organisation.
- The issues raised by the LMfS review may be sensitive or difficult for an organisation to accept. The reviewer(s) therefore must be suitably challenging, robust to being challenged and/or have the right arrangements (management sponsor, technical review groups, etc.) in place to provide this support.

The review will benefit from having support in the form of a Sponsor at the highest level within the company. The Sponsor has a role to champion a positive and open attitude of co-operation and willingness to learn from the review.

The scope and boundaries of the review will need to be defined, establishing proportionate depth of review in relation to level of risk and stage of lifecycle, although all areas of LMfS should be covered: it needs to be 'fit for purpose'.

It is also necessary to define how the review will integrate with the rest of the Periodic Review: it may not be appropriate to include the full review within the document; a summary document may be better. There will be areas of the LMfS Review that overlap or interact with other aspects of the PRS, and it is helpful to consider this in designing the Review of LMfS.

A team will need to be identified from within the organisation to support the review, integrating key individuals according to the areas to be covered (see Appendix A). This requirement is flexible and may include external specialists, e.g. a workplace psychologist, or behavioural scientist to review aspects of safety culture.

The lead reviewer/team should [Ref 20]:

- Plan the assessment,
- Collect evidence,
- Judge evidence for authenticity,
- Evaluate and interpret evidence,
- Record decisions,
- Give feedback, and
- Facilitate, control and manage the assessment process.

Key Stakeholders in the Review

The review is being produced primarily for the organisation (the Licensee or Authorisee) in a similar manner to the Safety Case itself, for submission to the regulator. It will make the case for the next period of operation – typically ten years - until the next Periodic Review or if this is expected to be for less than ten years, for the remaining lifetime of the facility. It is addressed to the organisation in order to identify deficiencies and risks in the management system and the improvements required.

As well as the organisation's Senior Management Team, stakeholders may include any or all of the following:

- ONR, DNSR, EA and SEPA as Regulator
- Internal Regulator
- Those responsible for LC15/AC15, and those undertaking the Periodic Review
- Senior Managers and Lead Teams
- EH&S/SHE/HS&E Process Owners
- Project Sponsors
- Supervisors
- Shop floor workers
- Union Safety Representatives
- Customers
- Parent Companies

What does 'good' look like?

There are a large number of standards and other publications that offer guidance on establishing good practice in different aspects of LMfS. The review should carry out a search of the most relevant standards available at the time, and determine which ones are most appropriate for the Periodic Review. These are underpinned by legislation as described in Section 3.0. Aspects of good practice are reflected in the legally binding Licence Conditions (ONR) and Authorisation Conditions (DNSR) relating to LMfS and in the ONR's Safety Assessment Principles (SAPs) [Ref 1]:

- MS.1: **Leadership**: Directors, Managers and Leaders at all levels should focus the organisation on achieving and sustaining high standards of safety and on delivering the characteristics of a high reliability organisation (see *Terminology* above).
- MS.2: **Capable Organisation**: The organisation should have the capability to secure and maintain the safety of its undertakings.
- MS.3: **Decision Making**: Decisions at all levels in the organisation affecting safety should be informed, rational, objective, transparent and prudent.
- MS.4: **Learning from Experience**: Lessons should be learned from internal and external sources to continually improve leadership, organisational capability, the management system, safety decision making and safety performance.

These are supported by a number of ONR's Technical Assessment Guides (TAGs) listed in Appendix B.

The IAEA have produced several publications and Safety Standards relating to LMfS, including IAEA SSG-25 'Periodic Safety Review for Nuclear Power Plants' [Ref 21] which includes aspects of LMfS that should be considered as part of a Periodic Review of Safety, particularly:
- Safety Factor 8: Safety performance
- Safety Factor 9: Use of experience from other plants and research findings
- Safety Factor 10: Organisation, the management system and safety culture
- Safety Factor 11: Procedures

The recently-published IAEA GSR Part 2 'Leadership and Management for Safety' [Ref 22] LMfS lists 14 specific requirements grouped into:
- Responsibility for Safety,
- Leadership for Safety,
- Management for Safety,
- Culture for Safety, and
- Measurement, Assessment and Improvement.

The Western European Nuclear Regulators Association (WENRA) uses a system of Reference Levels [Ref 23] for existing reactors. Information is also available from International Nuclear Power Operators (INPO), the World Association of Nuclear Operators (WANO) and more generically from the HSE as well as from other industries. The SDF Leadership and Management for Safety Principles [Ref. 24] provide a collation of the key principles from these many sources of information.

A more comprehensive list is presented in Appendix B.

There are key themes throughout these documents, presented below and loosely structured around the four areas identified by the SAPs, although alternative structures could equally well be used for the review as described above.

The following features are not intended in any way to provide a comprehensive list of the features of 'good' LMfS, but are included here to provide an overview of good practice:

Leadership including Board and Governance

- Includes a range of capabilities within the Board composition, with separation of the Chair and Chief Executive.
- Defines tolerance to risk, goals for safety, with workflows and business structure to achieve goals.
- Encourages robust challenge in relation to decisions related to safety.
- Communicates effectively, openly and honestly up, down and across the organisation and with contractors.

- Promotes visible leadership with Senior Management involvement.
- Establishes a 'living' health and safety policy that is an integral part of the organisation's culture, values, business targets and performance standards ensuring that it is updated regularly to reflect current business priorities.
- Sets clear standards, expectations and accountabilities in relation to behaviours and actions that support safety.
- Visibly demonstrates the safety values and safety culture at all levels of management, supported by effective communications of these values.
- Recognises and resolves conflicts between safety and other goals.
- Sets performance indicators that are relevant to nuclear safety and are reviewed regularly at all levels.
- Includes safety and safety reviews in meetings at all levels, with actions being set and followed-up.

Capable Organisation

- Has a Safety Management System (SMS) that ensures that policies and objectives are implemented in a safe, efficient and effective manner; it is controlled, usable, readable, clearly identified and readily available at the point of use.
- Uses sound H&S advice underpinned by adequate resources to implement the Safety Management System.
- Defines competence requirements and skill development, with role descriptions, manpower planning, training, professional development and knowledge transfer.
- Audits the effectiveness of the SMS and its associated risk controls, decides on and implements any relevant actions.
- Integrates the Nuclear Baseline with wider resource management, recognised as part of 'good business', managing resilience.
- Has written systems covering accountabilities, responsibilities and authorities; risk controls, emergency planning and management of change.
- Carries out risk assessments routinely and robustly, then adheres to them.
- Encourages an open, honest and fair reporting culture.
- Monitors safety performance through Key Performance Indicators (KPI) using both leading and lagging indicators.
- Makes provision for ensuring continual improvement.
- Has a robust and comprehensive training programme.
- Structures knowledge capture and management.
- Has a programme of leadership development.
- Has a policy for using contractors, oversight and recognition of vulnerabilities and contingencies.
- Extends the training programme through all levels, including supply chain and contractors.
- Communicates effectively and manages requirements with the supply chain including Intelligent Customer capability.
- Supports a co-operative approach to problem-solving.
- Uses a clear system to explain how work is to be specified, prepared, reviewed, performed, recorded, assessed and improved.

The SDF Guide 'Organisational Capability and Resilience [Ref 25] provides an additional source of information in this area. The Guide gives a broad overview of the key attributes of a Capable Organisation, along with sets of self-assessment questions in the areas of:
- Business objectives and Plans
- Governance and Assurance
- Organisational Culture
- People

- Process and Tools

Decision Making

- Consults employees or their representatives and ensures they are involved in safety decisions at every level.
- Encourages robust challenge in relation to safety decisions at all levels, and this is designed into the process for making key decisions.
- Decisions relating to safety are informed, rational, objective, transparent and prudent.
- Resolves conflicts between nuclear safety and other business goals.

Learning from Experience

- Responds to changed legal advice and promotes a culture of eagerness to learn from experience (LFE).
- LFE, both within the organisation and across the industry.
- LFE, identifying root causes and systematic issues, ensuring that corrective actions are taken.
- Regularly reviews the company's safety performance at Senior Management level.
- Shares best practice within the organisation and across the nuclear industry.
- Monitors the implementation and impact of any legislative or business driven changes.
- Effectively reviews events, and analyses information to inform priorities.
- Has a healthy reporting culture and good worker engagement in identifying issues.

Safety Culture

In addition to the essentials of the management system and activities that are required to make LMfS effective, good LMfS is also evident in the less tangible aspects of safety, expressed as safety values and safety culture. This is an area of safety with a rather different vocabulary, that uses words such as 'whole-hearted', 'ownership', 'openness', 'participation', 'belief' and 'trust'; it captures the embedded ethos of safety and the personal behaviours and traits necessary for successful implementation, rather than just the management structure that controls it.

A healthy safety culture displays a number of traits described by the World Association of Nuclear Operators (WANO) as a series of principles explained more fully in Reference 26.

They can be summarised as:

- Individual commitment to safety: Personal accountability
  Challenging and questioning attitude
  Safety communication

- Management commitment to safety: Leadership accountability
  Purposeful decision-making
  Respectful work environment

- Management systems   Continuous learning
  Problem identification and resolution
  Environment which allows challenge and encourages raising concerns
  Work processes evolution and innovation

The Hudson model (developed from work in the Oil and Gas industry, Figure 1, Ref 27, 28) can be used to illustrate the stages of maturity of a Safety Culture.

It depicts the spectrum of Safety Culture maturity beginning with an attitude to safety of 'the end justifies the means' that was typical of the 1970s. The requirement for the industry to produce safety cases started a gradual change in attitude, developing through the 'Reactive' stage where 'Safety' is something to be learned from accidents, and the 'Calculative' stage of assessments against targets, then maturing into a more 'Pro-active' approach of having a system that looks for any remaining problems. The pinnacle of Hudson's Safety Culture model is the 'Generative' stage of an embedded safety ethos of 'Safety is how we do business round here'.
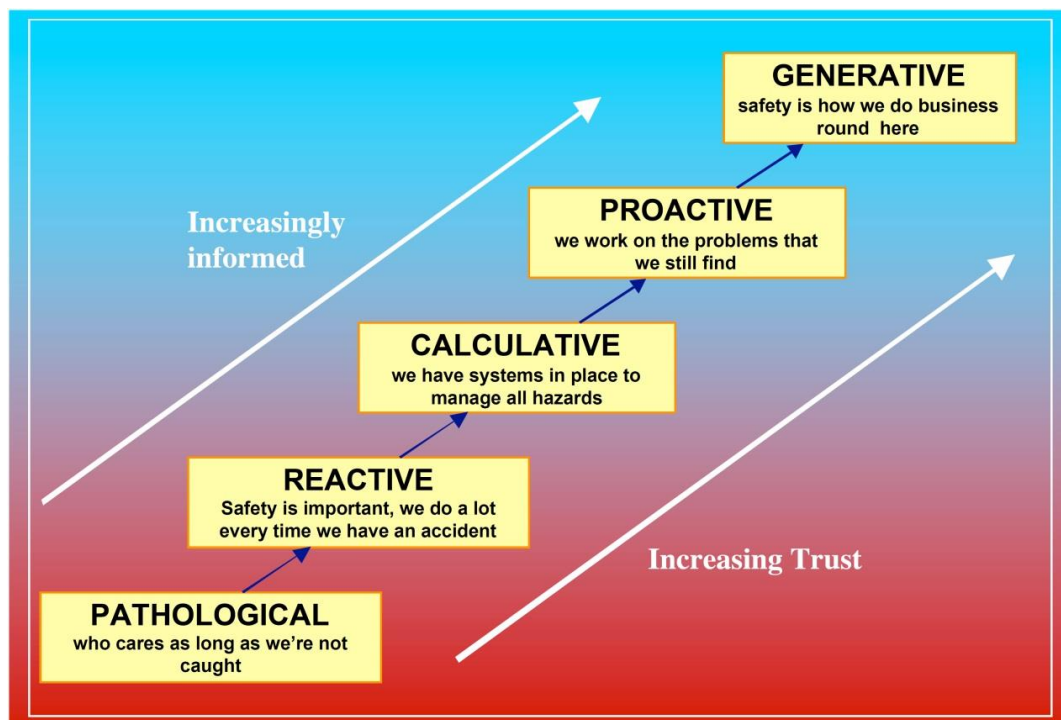

Figure 1: **The Hudson Model of the Development of the Maturity of Safety Culture**
(used by kind permission of Prof P. Hudson)

In addition to a number of the features listed above, a healthy safety culture will be evident in:

• The language being used, including constructive discussion associated with identifying safety issues and reducing risk, and challenges to assumptions,
• Employee involvement, communication, willingness to learn, trust, openness, and
• Recognition and reward for safe performance.

The 'stages of maturity' can provide the basis for rating the review findings.

Conducting the Review

There are a number of stages to conducting a review and these are considered in order below, from defining the scope, selecting appropriate criteria, collecting evidence and rating the findings to establish areas of good practice and identify any required improvements. One example of a 'good practice' method for a review of LMfS is presented in Appendix C taken from a review conducted at Harwell Research Sites Restoration Ltd (RSRL). It forms the basis of method suggested here.

Appendix D records some of the key learning points from an extensive review of LMfS undertaken within BAE Systems. Although it formed part of a much larger and more detailed review structured around the IAEA Safety Factors [21], it followed similar steps to those described below.

Defining the Scope of the Review

In conjunction with members of the Senior Management Team, the reviewer(s) can use the organisation's safety policy or safety prospectus documents along with organisational charts and other documents or evidence to define the breadth of the review. There should be a clear focus on nuclear safety, with the review being proportionate to the risks, the scale of operation and the lifetime stage of the facility(ies).

In the context of the requirements of Periodic Review, 'safety' includes nuclear, radiological, criticality and fire safety. Other aspects of safety such as conventional safety, chemo-toxic safety and environmental issues in nuclear and non-nuclear operations may be included, but this is not essential.

Although any events or incidents, or series of incidents, may indicate a 'theme' for the assessor to investigate, there should generally be no constraints on the direction that the assessment of LMfS could take.

The interfaces with reviews for other facilities or levels of the organisation should be defined.

The scope and structure of the review should be shared with the regulator, as part of the overall Periodic Review, to confirm that it is proportionate to the risks and meets regulatory requirements [Ref 3].

Establishing Criteria

The reviewers and the Senior Management Team agree on the criteria against which a judgement of the adequacy of LMfS will be made. This should take account of current legislation, regulatory requirements and best practice.

As indicated above, the key requirements for the UK Civil Nuclear Industry related to LMfS are contained in ONR's Safety Assessment Principles for Nuclear Installations (SAPs) 2014 revision [Ref 1], and these are used in this Guide to provide a structure for the review. However, it is recognised that other structures could be used, for example the relevant Safety Factors of IAEA SSG-25 Periodic Review for Nuclear Power Plant [Ref 21].

The SAPs give the following high level inter-related principles:

- MS.1: **Leadership**
- MS.2: **Capable Organisation**
- MS.3: **Decision Making**
- MS.4: **Learning from Experience**

These are supported by a number of Technical Assessment Guides (see Appendix B for fuller listing) including, but not limited to:

- NS-TAST-GD-048 – Organisational Capability [Ref 29].
- NS-TAST-GD-049 – Licensee Core and Intelligent Customer Capabilities [Ref 30].
- NS-TAST-GD-050 – Periodic Safety Reviews (Periodic Reviews) [Ref 3].
- NS-TAST-GD-065 – Function and Content of the Nuclear Baseline [Ref 31].
- NS-TAST-GD-072 – Function and Content of a Safety Management Prospectus [Ref 32].
- NS-TAST-GD-080 – Challenge Culture, Independent Challenge Capability and the Provision of Nuclear Safety Advice [Ref 33].

Additional standards from a review of best practise may also be included, for example:

- IAEA GSR Part 2 – Leadership and Management for Safety [Ref 22]
- INPO 12-006 – Benchmarking Nuclear Safety Culture Practices [Ref 34]
- WANO PL 2013-01 Traits of a Healthy Safety Culture [Ref 26]

These documents can provide basis statements against which to conduct the review, and the selection of criteria should be tailored to reflect the facility operations and lifetime stage as indicated previously.

An extensive list of aspects of LMfS that may be considered when selecting the appropriate criteria and the areas for the Review is given in Appendix E.

Processes for gathering information

The reviewers and Senior Management Team agree on the processes for the review including:

A review of documents: these may include recent audits reports, event reports, SMS documents, meeting minutes, performance metrics/indicators, operating experience, self-assessments and benchmarking reports.

The review will sit within a framework of other audit and review activities (both internal and external) and it is important to draw on existing audit findings to avoid duplication. Due credit can be given for any improvements from the audits or reviews that have been or are being implemented.

As well as previous audits and reviews, physical evidence extends across a wide range of internal documents including annual reports and business plans; improvement plans; company standards; management of change process; KPIs and reviews; meeting minutes; safety case and supporting documentation; performance management reviews and management of shortfalls. A more extensive list is presented in Appendix F.

Direct observation, including visibility of leadership, appropriateness of communication, plant tours, conduct of meetings, challenges to decisions, ways in which people work together.

'Recognition statements' beginning 'Do I see/hear...' are listed in Appendix G [taken from Reference 35]; whilst these were originally developed to assess confidence in a Safety Case, they can also apply to a review of LMfS. They look for behaviours which are indicative of a commitment to safety and of a mature and embedded Safety Culture.

Interviews with personnel, either on a one-to-one basis (eg for directors, managers and specialist roles) or in a small group discussion/workshop format (eg for supervisors, engineers, operators and maintenance staff). A full range of personnel should be included extending as appropriate to support staff, supply chain, contractors and the internal/external regulator (see Appendix A for a more extensive list).

Examples of powerful diagnostic questions that may be used by the reviewer are suggested in Appendix B of Reference 20. Some useful opening phrases are:

How effective is…?	How achievable are… (targets)?
How consistent are..?	How well-established..?
How adequate is…?	How rapidly…?
How clear is…?	To what extent..?

How readily can…?	What arrangements..?
How well can…?	Is … well communicated?
How regularly…?	

Undertaking the review

Using the agreed processes, the reviewer collects evidence relating to both:

- *intent*: this relates to the intent of the organisation's arrangements as specified in the safety prospectus, safety policy and safety management system, and any other relevant evidence, and

- *implementation*: this relates to the implementation of the arrangements in day-to-day operation of the facility.

Objective evidence should be obtained, in order to support findings and any improvements that may be required. It may be helpful to summarise the evidence required beforehand in an 'evidence specification'. This will aid in making the evidence available to the reviewer, to support later reviews, and to demonstrate good practice to an independent verifier [Ref 20].

Evidence from different sources will enable the reviewer to make a generic overall judgement about an issue, whilst noting instances of excellence or identifying localised problem areas. The depth of evidence required to support a finding will need to be proportional to the magnitude of the issue and to the likely resistance to accepting it or any action required for its resolution.

Rating Performance

Both intent and implementation should be rated against the criteria on a scale that is typically composed of 4 or 5 levels, for example, corresponding to Hudson's model of safety culture maturity:

1)	Exceeds modern standards, setting new 'best practice', 'Safety is how we do things round here'.
2)	Meets the modern standards, with evidence of proactive improvements.
3)	Somewhat below modern standards, or of variable standard, with improvements possible.
4)	Far below modern standards, with arrangements developed as a reaction to incidents.
5)	Minimal arrangements or commitment to safety evident.

There may be differences in safety culture within an organisation, particularly where there is a wider 'corporate' culture. Local differences may also arise reflecting local management attitudes.

Feedback of Findings

The lead reviewer presents the findings, both strengths and shortfalls, to the senior management team. This provides an opportunity for any clarification that may be required.

Consistent with ONR guidance on Periodic Review [Ref 3], shortfalls against modern standards or gaps, and instances of good practices should be identified.

If appropriate, the level of significance of the shortfall can be indicated by the reviewer, and these may be categorised in a similar manner to the way shortfalls are categorised in the rest of the Periodic Safety Review to identify significance and prioritisation. It may be beneficial for the regulator's representative to join the review team at this stage to gain an oversight of the issues identified. It should be left to the Licensee or Authorisee to decide on the action needed to remedy the shortfall.

In dealing with difficult findings it may be helpful for the reviewer to have an early discussion with the Senior Management Team 'sponsor' to help with acceptance of such issues. Findings should be well-evidenced, and an overwhelming case should be presented, usually presenting the most compelling piece of evidence first.

It is then necessary for the Senior Management Team to establish prioritisation and timescales for actions, identify the 'shortfall owner', and regularly review progress, completion and close-out.

The reviewer will also give, or contribute to, an assessment of the combined effects and overall impact of the strengths and shortfalls, and any interfaces between shortfalls. This will help to inform a more integrated improvement programme and prioritisation of shortfalls.

The first Periodic Review of LMfS will form a baseline for subsequent reviews.

Requirements for Verification and Independent Review

The review should be verified by a suitably qualified and experienced person (SQEP) to confirm that the findings of the review are accurate and valid. The independent review should consider:

- Completeness of the evidence gathered/ acceptability of scope,

- Appropriateness of evidence and its interpretation,

- Justifiability of judgements made.

There are no specific requirements for an Independent Peer Review of the findings from the Periodic Review of Safety. This can be undertaken in accordance with the organisation's governance arrangements, again by someone who is an appropriate SQEP for this task. The Peer Reviewer must have a good understanding of the industry/organisation and be able have healthy, challenging discussions.

Note that the SQEP requirements for these two roles are likely to be different.

Summary of Key Points

This Guide is intended to help a Senior Management Team to plan a Periodic Review of LMfS, and to offer guidance to the reviewer/s on what good LMfS looks like, and how a review could be structured.

A Periodic Review of LMfS needs to be tailored in both breadth and depth to the organisation being reviewed, be it single site or multiple site/facilities, and to the phase of the life-cycle of the facility. Review of organisational LMfS at a corporate level needs to be integrated with other normal business activities reviewing the implementation of related processes, procedures and instructions.

The Senior Management Team will appoint a reviewer, or review team, bearing in mind that they should have suitable knowledge and experience of the broad areas of leadership, capable organisation, decision-making and learning in accordance with the ONR SAPs principles for LMfS [Ref 1]. The reviewer/s needs to be able to interact at all levels within the organisation, and have the gravitas to present any challenging findings to the Senior Management Team. A team will be identified within the organisation to support the review.

This Guide looks at some of the common features found in various standards and publications relating to different aspects of good LMfS including the maturity of the organisation's safety culture.   The ONR's SAPs group these aspects into four key principles [Ref 1]: Leadership, Capable Organisation, Decision Making and Learning from Experience. This guide uses the ONR grouping of criteria to provide a structure for a review, assessing both the intent of the organisation and the implementation of that intent in meeting relevant criteria.

Suggestions are presented for physical evidence that can be used in the review, observations that can be made of different activities and behaviours, and questions that can be asked to determine both effectiveness of the safety management system and depth of understanding by key personnel. Key roles within the organisation and work areas are listed, as well as forms of questions that could be used, and behaviours to look/listen for.

The reviewer/s will collect evidence and rate performance in accordance with reference to the organisation's objectives. Shortfalls are identified and categorised. Findings are fed back to the Senior Management Team and actions are identified. A review of the cumulative effects of the shortfalls will support appropriate prioritisation of implementation of any identified actions.

The requirements for verification and independent review are discussed briefly. The appendices include an example of the method for a review used at RSRL (undertaken by Greenwood Berman) and some key learning points from an extensive review undertaken by BAE Systems.

References

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16 Energy Act 2016

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18 Corporate Manslaughter and Corporate Homicide Act 2007

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Appendix A – Possible Review Team Members

Members from the following departments, or with the following roles or skillsets may be members of the Review Team, or may be consulted as a source of information for the review:

Director/Senior Management Team member
Management System Process owner
Compliance
Process owner
Operations Manager
Decommissioning
HR
Finance
Contracts
Safety Department
RPA
SHE
Safety Case owner
HF specialist
Safety assessor
Safety culture
Engineering
Operator
Supervisor
Maintenance
Projects
Technical Support
Quality
LFE/OEF/OPEX
Emergency Planning
Continuous Improvement
Training

Supply chain

Independent (site auditor)
Internal regulator
ONR/DNSR site inspector

Appendix B: – Standards and Guidance Supporting Aspects of LMfS

Legislation:
- The Health and Safety at Work Act 1974
- Management of Health and Safety at Work Regulations (1999)
- The Energy Act 2013
- The Nuclear Installations Act 1965
- Corporate Manslaughter and Corporate Homicide Act 2007

Legally Binding Licence Conditions:
- LC6 – Documents, Records, Authorities and Certificates
- LC7 – Incidents on the Site
- LC9 – Instructions to Persons on the Site
- LC10 – Training
- LC12 – Duly Authorised Persons and other Suitably Qualified and Experienced Persons
- LC13 – Nuclear Safety Committee
- LC17 – Management Systems
- LC25 – Operational Records
- LC26 – Control and Supervision of Operations
- LC36 – Organisational Capability

ONR Safety Assessment Principles:
- MS.1 – Leadership
- MS.2 – Capable Organisation
- MS.3 – Decision Making
- MS.4 – Learning

ONR Technical Inspection Guides:
- NS-INSP-GD-006 – LC6: Documents, Records, Authorities and Certificates
- NS-INSP-GD-007 – LC7: "Incidents on the Site" and Other Reporting and OE Processes
- NS-INSP-GD-009 – LC9: Instructions to Persons on Site
- NS-INSP-GD-013 – LC13: Nuclear Safety Committee
- NS-INSP-GD-017 – LC17: Management Systems
- NS-INSP-GD-025 – LC25: Operating Records
- NS-INSP-GD-026 – LC26: Control and Supervision of Operation
- NS-TAST-GD-027 – Training and Assuring Personnel Competence
- NS-TAST-GD-033 – Licensee Management of Records
- NS-TAST-GD-048 – Organisational Capability
- NS-TAST-GD-049 – Licensee Core and Intelligent Customer Capability
- NS-TAST-GD-050 – Periodic Safety Reviews (Periodic Reviews)
- NS-TAST-GD-065 – Function and Content of the Nuclear Baseline
- NS-TAST-GD-072 – Function and Content of a Safety Management Prospectus
- NS-TAST-GD-077 – Procurement of Nuclear Safety Related Items or Services
- NS-TAST-GD-079 – Licensee Design Authority capability
- NS-TAST-GD-080 – Challenge Culture, Independent Challenge Capability and the Provision of Nuclear Safety Advice

IAEA Safety Standards:
- SF-1 [Safety Fundamentals] – Fundamental Safety Principles
- GSR Part 2 Leadership and Management for Safety
- GS-R-3 [Safety Requirements] – The Management System for Facilities and Activities
- GS-G-3.1 [Safety Guide] – Application of the Management System for Facilities and Activities
- GS-G-3.3 [Safety Guide] – The Management System for the Processing, Storage and Handling of Radioactive Waste
- NG-G-2.1, [Safety Guide]: Managing Human Resources in the Field of Nuclear Energy
- NS-G-2.4 [Safety Guide] – The Operating Organisation for Nuclear Power Plants
- NS-G-2.8 [Safety Guide] – Recruitment, Qualification and Training of Personnel for Nuclear Power Plants
- NS-G-2.11 [Safety Guide] – A System for the Feedback of Experience from Events in Nuclear Installations
- NS-G-2.14 [Safety Guide] – Conduct of Operations at Nuclear Power Plants
- NS-G-4.5 [Safety Guide] – The Operating Organisation and the Recruitment, training and Qualification of Personnel for Research Reactors
- SSG-25 [Specific Safety Guide] – Periodic Safety Review for Nuclear Power Plants
- INSAG-4 Safety Culture
- INSAG-13 Management of Operational Safety in Nuclear Power Plants
- INSAG-15 Key Practical Issues in Strengthening Safety Culture
- INSAG-25 A Framework for an Integrated Risk Informed Decision Making Process

WENRA Safety Reference Levels for Existing Reactors:
- Issue A: Safety Policy
- Issue B: Operating Organisation
- Issue C: Management System
- Issue D: Training and Authorization of NPP Staff (Jobs with Safety Importance)
- Issue J: System for Investigation of Events and Operational Experience Feedback

INPO
- INPO Good Practice Guides: Human Performance various
- INPO 06-003 Human Performance Reference Manual
- INPO 08-004 Human Performance Key Performance Indicators
- INPO standard ACAD 02-001, the Objectives and Criteria for Accreditation of Training in the Nuclear Power Industry
- INPO SOER 10-2 Engaged, Thinking Organisations
- INPO 12-008 (Revision 1) Excellence in Integrated Risk Management
- INPO 12-006: Benchmarking – Nuclear Safety Culture Practices Rev 1, August 2012
- INPO Level 1 Event Report 14-20 Integrated Risk – Healthy Technical Conscience
- INPO Principals for effective Operational Decision Making, 2004

WANO:
- WANO GL2013-01 / INPO Reference 12-012: Traits of a Healthy Nuclear Safety Culture, May 2013
- WANO – GL 2006-02 Principles for a Strong Nuclear Safety Culture inc addendum I: Behaviours and Actions that Support a Strong Safety Culture
- WANO – GL 2002-02 Principles for Excellence in Human Performance
- WANO PL 2013-2 (Revision 1) Excellence in Integrate Risk Management

Health and Safety Executive guidance:
- HSG65: Managing for Health and Safety

- HSG48: Reducing Error and Influencing Behaviour
- HSG245: Investigating Accidents and Incidents: A Workbook for Employers, Unions, Safety Representatives and Safety Professionals
- HSG254: Developing Process Safety Indicators: A Step-By-Step Guide for Chemical and Major Hazard Industries
- INDG417(rev1): Leading Health and Safety at Work
- INDG277(rev1): Leadership for the Major Hazard Industries
- RR899: High Reliability Organisations – a Review of the Literature
- RR952: A Review of the Literature on Effective Leadership Behaviours for Safety
- 7 Principles of Safety Leadership, on-line at http://www.hse.gov.uk/leadership/principlesleadership.htm

Safety Directors' Forum Good Practice Guide:
- SDF UK Nuclear Industry Guide to Organisational Capability and Resilience (in Draft at the time of writing this document)

Other:
- PSLG Principles of Process Safety Leadership, on-line at http://www.hse.gov.uk/Comah/buncefield/pslgprinciples.pdf
- Office of Rail Regulation: Railway Management Maturity Model (RM^3) V1.02

Appendix C: Example of the Methodology used in the RSRL Review of LMfS, undertaken by Greenstreet Berman

Greenstreet Berman are a consultancy specialising in human factors, ergonomics and business performance and safety. They undertook a review of LMfS for RSRL. An extract from their report outlining the method is reproduced below:

2 METHOD

2.1 Overview

The assessment method is outlined in Figure 1.

The assessment had a number of core elements, namely:

1. Scoping – bounding the area of review/assessment as per section 2.3.

2. Identifying criteria with which to make judgement on the adequacy of RSRLs arrangements, as per section 2.4.

   A set of criteria, based on ONR Safety Assessment Principles, have been used as per section 2.4.

3. Selecting the processes (e.g. which documents to review examination of records and so forth) and the staff to interview.

4. Conducting the review (e.g. reviewing documents and undertaking interviews). This included,

   - A series of one to one interviews with directors, managers and specialist roles, and two contractors;

   - Workshops with supervisors, engineers, operators and maintenance staff. A proforma was used to guide the workshops (see section 11),

     o The workshops and interviews were designed to reflect the full range of staff from directors to operators, thereby enabling cross-validation of information;

   - A review of documentation describing and exemplifying management systems and processes;

   - A review of issues identified within OEFs and incident reports (see section 9).

   The information and assessments drawn from workshops, interviews and documentation is provided in section 8, aligned to the ONR criteria.

   As per Figure 2, the interviews and documentation were used to profile the scope, purpose and nature of RSRL's leadership and management for safety – profiling the intended approach and arrangements. The interviews, workshops and documentation provided information on the "performance" of leadership and management, helping to critically evaluate their implementation. A brief review of OEFs and sample incidents gave further evidence as to the performance of leadership and management. In this way there was a "triangulation" of information to help profile and assess arrangements, cross referencing between interviews, workshops, documentation and OEFs.

5. Assessing RSRL's arrangements (see section 3 for a summary).

   A rating scale was used to assess RSRL arrangements (see section 2.4.2.) against the ONR criteria. RSRL's arrangements for leadership and management were assessed in respect of whether their scope, purpose and nature meet modern standards as well as whether their implementation meets

modern standards. The assessment was completed in the context of the specific operational and organisational requirements of RSRL, particularly:

- The shift from care and maintenance to decommissioning at some RSRL facilities, entailing new staff, new operations, new facilities and more contractors, with some operations ongoing;
- Combination with Magnox.

Whilst the ONR do cite expectations regarding leadership and management, these are generic across licensed sites. Therefore, the assessors interpreted the expectations for the specific operational and organisation context of RSRL, drawing on subject matter expertise in leadership and management.

6. Identifying and prioritising potential improvements (see section 5).

Having reviewed RSRL arrangements we suggested potential improvements. We had regard to the size of RSRL and the future decommissioning requirements in suggesting how RSRL may need to further develop arrangements. Improvements reflected the findings of the assessment, with due account given to the need to ensure RSRL arrangements meet future operational requirements and meet regulatory requirements.

Figure 1: Overview of assessment process

Figure 2: Review process
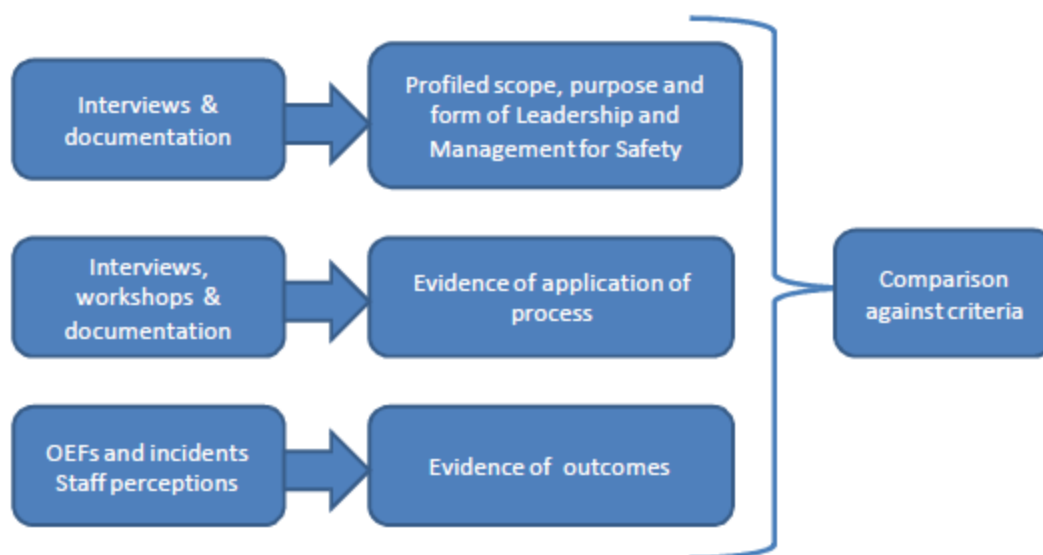
2.2 The assessors

RSRL appointed Greenstreet Berman Ltd to assist with the review of Leadership and Management for Safety, in order to provide an independent perspective on RSRL's arrangements.

Greenstreet Berman Ltd:

- Has extensive UK nuclear sector safety leadership, safety management, periodic review and safety case experience;
- Are an Institute of Human Factors and Ergonomics Registered Consultancy (IEHF);
- Have completed assessment work at other licensed nuclear sites in the UK (e.g. Aldermaston, Devonport Dockyard, Sellafield etc.);
- Are on the ONR technical support framework for HF and Management for Safety;
- Acted as ONR's HF specialist assessors for Nuclear New Build applications for GDA;
- Trained HSE nuclear inspectors in HF;
- Developed three HF guides for the Energy Institute.

In order to interpret the information gathered during the course of this review, and to assess RSRL against modern standards, Greenstreet Berman has deployed a team of SQEP assessors with experience drawn from across the high-hazard industries, who have applied their judgement to the evidence set out in this report. The assessment team experience spans most of the UK nuclear licensees across both civil and defence nuclear power. It also spans a range of non-nuclear high-hazard

organisations within such sectors as defence, transport (rail and maritime), utilities, non-nuclear power generation, oil and gas and pharmaceuticals.

The team has experience in the assessment of safety management arrangements within these industries, the development and implementation of improvement programmes, and the development of industry guidance and good practice.

2.3 Scoping

A key aspect of this work, given the potential size of the assessment activity, was to carefully scope the review. This involved the following activities:

- Initial scoping meeting (held on the 11th September 2014) to develop and agree a review plan, including a schedule of people to consult, documents to review and other sources of evidence to draw upon;
- Reviewing Harwell and Winfrith site summary documents [Ref 7, 8, 9];
- Considering company organigram outlining positions within the organisation.

Following the scoping activities, a list of documentation to review and roles to interview and engage with was drawn up and then sent to RSRL for acceptance and agreement. In addition, a more detailed set of questions to support the profiling of arrangements was developed (see section 2.3 benchmark and review). Information about the topics explored and the people consulted is provided in section 2.5.

To help ensure people were available to participate in the assessment a number of measures were put in place:

- A briefing note was provided to explain about the work and why it was required – see Appendix B;
- RSRL identified an individual to help manage the process to recruit participants for the assessment process (e.g. schedule interview/workshops times) and then remind people that their attendance was required.

The review was limited to RSRL's corporate leadership and management. This focused on reviewing the scope, purpose and nature of arrangements, sampling their implementation across the sites. The review did not aim to verify implementation of arrangements within each RSRL facility.

2.4 Review criteria

2.4.1 ONR Scope

The ONR state that whilst RSRL can determine how the review is structured, the following Safety Assessment Principles (SAP) [10] guide the scope of the PRS:

- Leadership and Management for Safety (MS.1 to MS.4) (page 47).

The application of the SAPs is further supported by Technical Assessment Guides (TAGs) and a number of these were identified as directly relevant to the development of the review criteria:

- Periodic Safety Reviews (PSR) NS-TAST-GD-050 [1];
- Function and Content of a Safety Management Prospectus (NS-TAST-GD-072) [2];
- Staffing levels and task organisation (NS-TAST-GD-061) [4];

- Function and management of the nuclear baseline (NS-TAST-GD-065) [5].

There are also a number of relevant international nuclear safety guides, such as INPO's "Benchmarking nuclear safety culture practices" [11] and WANO's "Traits of a healthy nuclear safety culture" [12] and IAEAs "Application of the Management System for Facilities and Activities" [13] that can be drawn upon.

The assessment criteria are shown in Table 2 - these are primarily taken from "Periodic Safety Reviews NS-TAST-GD-050, (pages 19 to 20) [1]. Table 2 also indicates the section of the document in which the assessment criteria are reviewed.

Table 2: ONR safety leadership review criteria

ONR criteria	Findings in section
Leadership	
1) **Governance and management** · How effective is the organisation's approach to the governance of nuclear safety (including the systems and processes for monitoring, directing and controlling activities from the licensee board and executive team downwards)?	3.3
· Is the management system 'fit for purpose' to meet nuclear safety requirements (including clarity of standards and expectations, appropriate and usable procedures, continual review and improvement)?	3.4
2) **Culture, leadership and communications** · How well does the organisation understand and demonstrate the attributes of a positive safety culture (including reviews and improvement plans)? · Are the leadership active and effective in promoting and implanting robust standards for nuclear safety and a positive safety culture? · Is there open, honest and effective communication throughout the organisation and with contractors, particularly on nuclear safety matters?	3.5
Capable Organisation	
3) **Organisational design** · Are the organisational design principles and the organisational structure appropriate to meet the nuclear safety needs of the business (particularly if the needs have changed)?	3.6
4) **Baseline** · Is the organisational baseline adequate, with effective processes for maintaining an organisation with suitable resources and competences to deliver nuclear safety including vulnerability analysis, succession planning, recruitment etc.)?	3.7

ONR criteria	Findings in section
5) **Management of change** • Are organisational changes managed well and due consideration given to the cumulative impact of changes or anticipated changes (including restructuring, changes of parent company, major changes to the activities of the site, e.g. entering decommissioning, or 'care and maintenance')?	3.8
6) **Competence management** • Does the competence assurance system (including knowledge management or transfer processes) define and deliver nuclear safety requirements?	3.9
Decision making	
7) **Decision making processes** • How is it ensured that nuclear safety is given appropriate consideration in decision making within the business (including the use of good quality information, diverse views and questioning of assumptions, exploration of all relevant scenarios that may threaten nuclear safety and due consideration of options)? • How well is the principle of conservative decision making applied, in the interests of nuclear safety, when faced with uncertainty or the unexpected?	3.10
8) **Challenge culture** • Is there a healthy 'challenge culture' and appropriate internal challenge for decisions of all types at all levels that may impact upon nuclear safety (including, but not limited to, a strong 'internal regulator' function)?	3.11
9) **Indicators** • Are the performance indicators/metrics, particularly those used at senior levels, sufficiently relevant to nuclear safety and are there any significant gaps in coverage; are the indicators used in combination with other, qualitative sources of information (e.g. audits/reviews, operating experience)?	3.12
Learning organisation	
10) **Reporting culture** • Is there an open and fair reporting culture (do managers encourage this)?	3.13

ONR criteria	Findings in section
11) Learning processes • How well are opportunities for learning captured, collated, considered and acted upon (is learning being embedded)? • Do event investigations/root cause analyses identify and address systemic issues (underlying leadership, organisational and cultural factors)? • Does the organisation actively seek out and act upon external sources of learning (including non-nuclear sectors)? • Is there an adequate range of self-evaluations and independent evaluations (including cross-cutting themes such as leadership and culture)? • Is there an integrated approach to organisational learning (pulling together lessons from internal and external events, investigations, evaluations, organisational changes etc.)?	3.14

2.4.2 Rating scales

Rating of leadership and management for safety

A scale was used to indicate the assessment of RSRL against each of the ONR criteria, as per Table 3. We critically compared RSRL arrangements against the criteria. In each case we cite the reasons for the rating and summarise the key observations. The narrative review would cite any differences between RSRL practices and modern standards and relevant evidence from operational experience.

Table 3: Scale for rating RSRL fulfilment of ONR criteria

1) Exceeds modern standard, generating new arrangements that set the standard for the sector
2) Consistent with modern standards, with examples of proactively trying to improve arrangements
3) Somewhat below modern standards and/or a mixed picture, with arrangements developed in a bureaucratic or piecemeal calculative manner, some points of potential improvement possible
4) Far below modern standards, arrangements developed in a reactive manner, many points of substantial improvement possible
5) No or minimal discernible arrangements in place, or arrangements are dysfunctional, with arrangements possibly motivated by goals other than improving nuclear safety performance

Rating scale used within workshops

A similar scale was used within workshops, as per Table 4. The workshop proforma

is shown in section 11. The workshops asked RSRL representatives to read a series of descriptive statements and choose one that they judged best represented their recent experience of RSRL. Table 4 shows the types of adjectives used per statement and the corresponding scale used for assessing L&MfS.

The descriptive statements broadly align to the scale used in Table 3. For example, the assessors would consider modern standards to require a "proactive" approach to safety.

Table 4: Rating scale used within workshops and alignment to Table 3

Terms and scale used in workshops	Corresponding rating within assessment of L&MfS
Leading, inspirational, innovative, generating new ideas	Exceeds modern standard
Proactive	Consistent with modern standards
Managing	Somewhat below modern standards
Reactive	Far below modern standards
Dysfunctional, counter productive	No or minimal discernible arrangements in place

2.5   Information sources

2.5.1   Personnel consulted

A series of interviews and workshops were scheduled at the outset of the project which involved participation of approximately 80 individuals from both Winfrith and Harwell site and across the organisational hierarchy from the Managing Director to operators.

Based on previous experience of similar engagement, this is considered to be a high participation rate. The support provided by RSRL staff, both in helping to arrange and also participating in the interviews and workshops, was considered to be a very positive indication of the importance placed on nuclear safety leadership by RSRL

In summary, roles participating from both Winfrith and Harwell are noted in Table 5.

Table 5: Roles consulted

Interviews	
Directors	**Specialist roles & managers**
1. Managing Director 2. Programme Director 3. RSRL Head of Finance 4. Assurance Director 5. Winfrith Programme Director 6. Programme Director	16. Support Manager (Baseline) 17. Baseline manager 18. Lead planner 19. Lead estimator 20. Safety case managers 21. Operational safety manager 22. Health physics manager 23. Health and safety advisor 24. Skills and training manager 25. HR Manager 26. Head of HR 27. Internal regulation manager & advisor 28. Harwell Health and safety advisors 29. Head of contracts 30. Safety managers of contractors involved in facility construction or decommissioning work
Operational, maintenance and project managers	
7. Maintenance manager 8. Harwell Maintenance and Operations managers 9. Operations manager, 10. Maintenance Manager 11. Project manager 12. LETP senior project manager 13. Technical support manager 14. Decommissioning project manager 15. Harwell Emergency planning manager	
Workshops	
1. Harwell operations team leaders/ supervisors 2. Winfrith operations team leaders/ supervisors 3. Winfrith project engineers 4. B462 (Harwell) design team engineers	5. Maintenance, electrical, mechanic team leaders (foremen) Harwell maintenance staff 6. Winfrith maintenance staff 7. Winfrith operators 8. Harwell operators

Findings from different evaluation methods were triangulated to reduce the risk of results being skewed by singleton strong opinions that might be voiced during interview or at a workshop. Interviewers and Facilitators were experienced in seeking to mediate or contextualise outlying comments and observations.

In the detailed reporting of interview and workshop outputs, where an outlying opinion has been noted, comments have been provided to contextualise the difference from other expressed views (e.g. perceived grievance or other local factors).

2.5.2 Documentation

A wide range of documentation was acquired, as per section 7, to help profile arrangements and to support assessment of implementation. The documentation includes, for example: manuals; processes; meeting minutes; management of change assessments; work instructions and training material.

2.5.3 OEFs and incident reports

We reviewed whether the operational experience and learning processes are fit for purpose and whether operational experience to identify examples of where leadership and management arrangements for safety have contributed.

Appendix D: Key Learning Points from a Review of LMfS undertaken by BAE Systems as part of a Periodic Review of Safety

The BAE Systems Review of LMfS, was undertaken as part of a complex and detailed Periodic Review of Safety. A number of 'low level' reviews were undertaken in different areas of the company, and the findings collated to give a 'high level' overview. Some of their key learning points are described here:

- A lot of work was put into identifying the scope and intended structure of the Review of LMfS, and was considered the 'key' to producing a successful review. This basis document was presented to the regulator as part of the overall scope of the Periodic Review of Safety. A Notice of No Objection (NONO) was issued by the regulator prior to the PRS being produced.

- A review of *all* relevant good practice documents was undertaken to form a benchmark of criteria relevant to the site, which underpinned the entire PSR. Owing to the timescale of the review (taking 2 years to establish the basis document) a 'datum' was set beyond which any changes in good practice were not included.

- Prior to undertaking the formal Review of LMfS, staff were asked to identify 'sore thumb' issues, that is, those issues that were uppermost in people's minds. Minor issues were actioned immediately whilst the significant issues were identified for inclusion in the main Review. This process enabled workers to think more widely about the issues of the Review, knowing that the immediate 'sore thumbs' had already been addressed.

- There were three main elements to the review:
    1. Is the suite of management arrangements self-consistent and traceable?
    2. How good is LMfS when compared against Good Practice?
    3. Do the LMfS arrangements have the intended outcome?

- Care was taken with terminology during the review, and the use of precise language was encouraged. Minor issues were actioned before they reached the stage of becoming 'findings', so that the final review findings were confined to the most significant and a realistic plan of action could be developed to deal with them.

- Reviewing safety culture presented a challenge. It was done by using recent safety culture audits; all the aspects that were not addressed by existing audits were identified as a 'finding' so that these issues could be considered in future audits. Questionnaires and focus groups were used to eliminate bias. Validation of the safety culture review looked at statistics of responses to ensure that the outcome was not skewed by personal points of view.

- A key issue for the regulators was the level of significance attributed to issues raised, with respect to judging the safety of continued operation. Low level reviews (in terms of business structure) were undertaken. Categorisation of issues was checked for consistency across different areas of the review and an over-view of findings was compiled. The supporting evidence and audit trails for the findings needed to be proportional to the significance of the issue.

- The BAE Report formed a substantial document. Whilst it is not possible to reproduce the report in this guidance note, the contents list below indicates the format and approach to reviewing the significance of the findings, both strengths and shortfalls:

1. **Introduction**
   - Background
   - Purpose and Objectives
   - Document Scope
   - Document Classification and Due Process
   - Structure

2. **Safety Factor Review Scope and Approach**
   - Approach to the identification of the Review Scopes
   - Approach to Undertaking the Review
   - Completeness of the Detailed Reviews Undertaken
   - Review of Status of Existing Relevant Work

3. **Review Output including Common Themes**
   - Relevant Good Practice
   - Review of the Configuration
   - Review against Relevant Good Practice
   - Review of Evidence of Compliance against Current Processes
   - Identification of Review Themes – and individual themes
   - Interfaces
   - Observations

4. **Significance of Findings**
   - Significance of Identified Shortfalls
   - Significance of Identified Strengths
   - Balance of Shortfalls against Strengths

5. **Review Summary and Conclusions**

6. **References** etc

Appendix E - Aspects of Leadership and Management for Safety that may be included in the Review

The aspects of LMfS are grouped loosely here approximating to the structure used in the ONR SAPS [Ref 1], although it is recognised that other structures may be more applicable to a particular organisation:

Leadership

- Leadership development
- Leadership visibility
- Communication of high standards of H&S
- Business model setting values
- Consistent action that reinforces the organisation's values
- Performance correction at early signs of problems
- Plans are developed and resourced taking account of economic climate
- Resolution of conflicts between safety and other goals
- Clearly defined and understood risk management processes, Safety Policy and objectives
- Appraisals reflecting company values
- Team talks reflecting appropriate level communication

Capable Organisation

- Established Nuclear Baseline and forward planning
- Management of Change procedures - flexibility
- Robustness of LC36 Arrangements (Organisational Capability)
- Control of documents (production and records) and ease of retrievability
- Resource pool, age demographic
- Resource plans
- Integrated planning
- Forward planning assessing risks associated with organisational change
- SMS supporting efficient implementation of Safety Policies
- Clear understanding of roles in achieving H&S goals
- Governance arrangements giving clear ownership / accountabilities
- Clear understanding of competencies and roles required
- Recruitment, training, and staff development to meet safety objectives
- Professional accreditation
- SQEP/DAP processes
- Succession Planning
- HR
- Fairness of workloads
- Sickness, drug/alcohol testing
- Fatigue, stress, shift patterns / environmental stress
- SMS based on international standards
- SMS fully addresses legal requirements and references applicable standards
- SMS demonstrating proportionality and focus
- Intelligent compliance
- Safety case
- Transparency of safety arguments
- Responsibilities defined
- Arrangements for design, construction, manufacture , commissioning, operation and decommissioning
- Intelligent customer

- Use of contractors, contractors vs staff
- Checks of suppliers' systems/quality to ensure fit-for-purpose service/product
- Controlling mind
- Major risks are identified and risk control is understood
- Safety is given due priority
- Constructive challenge to unsafe acts and conditions
- Safety committees, engineering forums
- Plant/facility owners
- Asset care
- Engineering, Maintenance, Inspection and Testing (EMIT, or EIMT)
- Periodic review
- Number, type and frequency of events and analysis / shortfall identification
- Routine surveys – approach to findings
- Action plan, prioritisation and progress on planned improvements
- Evidence of addressing safety issues
- Trend analysis of KPI metrics (suitability of metrics)
- Continual improvement
- Identification of strengths within systems
- Staff morale
- External influences
- Site sustainment plans for the future
- Business continuity and resilience, business risk management
- National/international interactions (eg universities)

Decision Making
- Decisions at all levels should be objective, transparent, prudent and give safety a high priority
- Decision-making process if a challenge occurs
- Worker involvement
- Precautionary approach, especially in the absence of complete data
- Conservative decision-making
- Actions to improve performance should be specific, actionable, measurable, timely
- Effectiveness of Internal Regulatory Function
- Extent of authority clearly understood

Learning from Experience
- Information actively sought internally and from outside the organisation to improve leadership capability, decision making and safety performance
- Benchmarking
- Knowledge capture system, knowledge management – arrangements and delivery
- Corporate memory
- Lessons derived from learning should be embedded through a structured system of implementing corrective actions that is rigorously applied
- Measurement/assessment groups eg annual review of safety, quality audits, business improvement initiatives

Other Considerations

- Structure of any guidance
- Costs and advantages
- How to stop initiative overload
- Escalation of risk
- Whistle-blowing

Appendix F - Possible Sources and Areas for Information Gathering

Generic:

        ONR/IAEA/ INPO/WANO/WENRA guidance (see Appendix A)

        Significant events

        Examples of approach across industry

        Benchmarking of a Safety Management System

Organisation-Specific:

        Audits (eg Lloyds)/Inspections, internal and independent

        Surveillances

        Internal Regulator review

        Self-assessments

        Management review

        Safety Culture Surveys

        Annual Reports

        Annual review of safety reports

        Business Plan - visibility of safety improvements

        Review of implementation arrangements

        Review of trends over last 10 years

        Review of effectiveness

        Improvement Plans

        Outputs from Regulator inspections, Regulator notices

        Enforcement notices

        Non-compliances

        Management of change process

        Company Standards/policies/processes

        Organisational/ Nuclear/ Management baseline

        Corporate Memory, knowledge retention

        Safety Data – Adverse Event (AE)/Accident and Occurrence Reporting (AOR)

        Event Investigation Reports – Depth, extent, repeat events, Apparent Cause Analysis (ACA)/Root Cause Analysis (RCA)

        KPI metrics – training, PMP close-out, plant maintenance, OEF trends dashboards

        Balance Scorecards

        EMIT - indicators

        Leading/lagging indicators

        Management of change proposals – number, category, cumulative impact

        Evidence of being forward-looking to future challenges over next 10 years/ lifecycle

- resources/ funding

Demographics

Performance management – good/ bad behaviours

Task observations

Self-assessments

Management of existing shortfalls/ actions and correction plans

Observation of management visibility

Appendix G - Recognition Statements

Used by the Atomic Weapons Establishment (AWE) Aldermaston

The following questions, adapted from the AWE 'Recognition Statements', were originally prepared for reviewing safety cases, and may be helpful in reviewing the maturity of a Safety Culture:

- Do I see and hear engineers, operators, safety case personnel and other contributors working together to identify and address safety issues as part of their normal routine?
- Do I hear designers, engineers, safety case personnel, operators, safety committee members and other contributors challenging perceptions, assumptions, custom and practice?
- Do I hear that process operators, maintainers and other facility personnel have been engaged in the preparation of the safety case and find the outputs useful in helping them understand what they have to do to control hazards?
- Do I hear discussions about how to reduce risks further, even if risks are concluded to be acceptable?
- Do I see that decisions have been made by taking full consideration of the safety issues, that they incorporate measures to manage the residual risks and that the outcomes are reflected in safety documentation?
- Do I see that safety documentation has undergone an appropriate process of review and approval, culminating in commitment from the person responsible to actively manage the risks that have been identified?
- Do I hear that regulators have confidence in the Safety Case and Periodic Review processes and the safety documentation it produces?

Glossary

Term	Definition
ACA	Apparent Cause Analysis
AE	Adverse Event
AOR	Accident and Occurrence Reporting
ALARP	As Low As Reasonably Practicable
AWE	Atomic Weapons Establishment
DAP	Duly Authorised Person
DECC	Department of Energy and Climate Change
DNSR	Defence Nuclear Safety Regulator
EA	Environment Agency
EDF	Électricité de France
EH&S/SHE/HS&E	Environment, Health and Safety
EHSQS&S	Environment, Health, Safety, Quality Safeguards and Security
EMIT (or EIMT)	Examination, Maintenance, Inspection and Testing
H&S	Health and Safety
HR	Human Resources
HRO	High Reliability Organisation
HSE	Health and Safety Executive
IAEA	International Atomic Energy Authority
IoD	Institute of Directors
INPO	International Nuclear Power Operators
KPI	Key Performance Indicator
LC	Licence Condition
LFE	Learning from Experience
LMfS	Leadership and Management for Safety
MoD	Ministry of Defence
NONO	Notice of No Objection
NORMS	National Objectives, Requirements and Model Standards

OEF	Operational Experience Feedback
ONR	Office for Nuclear Regulation
OPEX	Operational Experience
PMP	Plant Modification Proposal
PR	Periodic Review (of Safety)
PSLG	Process Safety Leadership Group
RCA	Root Cause Analysis
RPA	Radiological Protection Advisor
SHE	Safety Health and Environment
SAPs	Safety Assessment Principles
SDF	Safety Directors' Forum
SEPA	Scottish Environment Protection Agency
SMS	Safety Management System
SQEP	Suitably Qualified and Experienced Person
WANO	World Association of Nuclear Operators
WENRA	Western European Nuclear Regulators Association

List of SDF Publications

Codes of Practice

Best Available Techniques for the Management of the Generation and
Disposal of Radioactive Wastes
Changeroom Design, Operation and Maintenance (withdrawn at the time of
writing, pending re-issue as a Good Practice Guide)
Clearance and Radiological Sentencing
Management of Change and the Nuclear Baseline

Good Practice Guides

Independent Oversight
Personnel Dosimetry Management
Respiratory Protective Equipment
Worker Exposure Durations for Design Base Analysis
The Application of ALARP to Radiological Risk
The Selection of Alarm Levels for Personnel Exit Monitors
Nuclear Baseline and the Management of Organisational Change
Organisational Capability and Resilience (in Draft at the time of writing this
document)
Safety Performance Indicators
Supply Chain Mapping
Supply Chain Quality

Other Guidance

An Aid to the Design of Ventilation of Radioactive Areas
Filter Visual Inspection Guide
Filter Safe Change Systems
Peer Review of Safety Cases
Conservative Exposure Durations for Unmitigated Worker Doses in Design
Basis Analysis
Key Attributes of an Excellent Nuclear Security Culture
Right First Time Safety Cases: How to Write a Usable Safety Case
Appropriate Conservatism in Safety Cases
Leadership and Management for Safety Principles (in draft at the time of
writing this document)
OELG Event Categories
Human Performance Blueprint
Human Performance for Nuclear Leaders Training Standard
Human Performance Fundamentals Training Standard
Human Performant Practitioner Training Standards and Guidelines