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| ONR Technical Assessment Guide  Safety culture assessment and improvement |



ONR Technical Assessment Guide (TAG)

Safety culture assessment and improvement

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# Introduction

ONR has established its Safety Assessment Principles (SAPs) [1] which apply to the assessment by ONR specialist inspectors of safety cases for nuclear facilities that may be operated by potential licensees, existing licensees, or other dutyholders.   
A suite of guides supports the principles presented in the SAPs. These guides provide further assistance to ONR’s inspectors when making regulatory judgements and decisions in their technical assessment work. This technical assessment guide (TAG) is one of these guides.

# Purpose and scope

## Purpose

The purpose of this TAG is to advise and inform ONR staff in exercise of their regulatory judgment as to the adequacy of the approaches dutyholders take to understand and improve their safety culture. This guide brings together relevant good practice outlined in several national and international standards and guides and draws upon lessons from academic research and practice. It also demonstrates how ONR has met the Western European Nuclear Regulators’ Association’s (WENRA) Reference Levels and has aligned its guidance to that contained in International Atomic Energy Agency (IAEA) Safety Standards. ONR has not written this TAG for dutyholders, and although they may use it as a source of guidance or good practice, they should not interpret it as a prescriptive set of legal requirements.

## Scope

Whereas the scope of the SAPs specifically excludes conventional hazards associated with a nuclear facility, except where they have a direct effect on nuclear safety or radioactive waste management, ONR acknowledges that dutyholders often assess safety culture holistically. It is, therefore, not practical for ONR to omit nuclear site health and safety (otherwise known as conventional health and safety) from the scope of this TAG.

Its scope is, therefore, the assessment and improvement of safety culture in its broadest sense: this includes nuclear safety, radiation protection, radioactive waste management, and conventional health and safety. However, inspectors should note that the guidance outlined in this TAG in intended to support inspectors when making regulatory judgements and decisions in their technical assessment work in pursuit of ONR’s nuclear safety purpose, and therefore inspectors should use this guidance accordingly.

# Relationship to licence conditions and other relevant legislation

## Health and Safety at Work etc. Act 1974

Whilst the United Kingdom’s Parliament has not prescribed safety culture within law, the Health and Safety at Work etc. Act 1974 places general duties on employers to ensure, so far as is reasonably practicable, the health, safety, and welfare at work of employees. The Act also places a general duty on employers to conduct their undertakings in such a way as to ensure, so far as is reasonably practicable, that they do not expose persons not in their employment to risks to their health or safety.

Reports of investigations into notable events such as Three Mile Island, Chernobyl, Davis Besse and Fukushima provide compelling evidence of the importance of establishing an effective safety culture. Furthermore, academic research over the past 40 years has also established the critical role of safety culture in achieving good safety outcomes.

It follows that to comply with the general duties to reduce risks so far as is reasonably practicable, an employer may consider it prudent to assess their safety culture, determine the level of risk which any weaknesses in the safety culture may introduce, and take measures to reduce these risks to as low as reasonably practicable.

## Licence Conditions

Licence Condition (LC) 12 states that a licensee shall make and implement adequate arrangements to ensure that only suitably qualified and experienced persons perform any duties which may affect the safety of operations on the site [2]. Licensees should, therefore, ensure that only suitably qualified and experienced persons perform safety culture assessments as they may result in changes to how people conduct nuclear operations.

LC 15 states that a licensee shall make and implement adequate arrangements for the periodic and systematic review and reassessment of safety cases [2]. A periodic safety review should include a comprehensive assessment of the facility’s condition, operating experience, safety case, management arrangements, and culture, looking forward for at least the next ten years and normally, to a lesser extent, the end of life [3]. This TAG supports LC 15 by providing guidance to ONR’s inspectors on the expected standards for the self-assessment and independent assessment of safety culture, which are an important component of a licensee’s periodic review of safety.

LC 17 states that a licensee shall establish and implement management systems which give due priority to safety [2]. Licensees should, therefore, ensure that management systems include provisions for the assessment and improvement of safety culture.

LC 36 states that a licensee shall provide and maintain adequate financial and human resources to ensure the safe operation of the licensed site [2].   
Licensees should, therefore, provide and maintain adequate financial and human resources for both conducting safety culture assessments and addressing the findings which arise from them as these are an important part of a licensee’s overall approach to ensuring the safe operation of the site.

# Relationship to Safety Assessment Principles, WENRA Reference Levels, and IAEA Safety Standards

## Safety Assessment Principles

ONR’s SAPs include four principles which set the foundation for the effective delivery of nuclear safety, including the development and maintenance of a positive safety culture [1]. These are:

* MS.1. Leadership.
* MS.2. Capable organisation.
* MS.3. Decision making.
* MS.4. Learning.

These four inter-related principles set the outcomes that dutyholders should achieve for the effective leadership and management for safety. They also identify the characteristics of a safety culture and place an expectation upon leaders to monitor and regularly review the culture.

Since the publication of the SAPs, ONR has commissioned research to develop a model and measure of safety culture [4]. All 17 of Great Britain’s (GB’s) licensees participated in the research and therefore ONR is confident that this model most accurately captures safety culture as it relates to GB’s nuclear context. ONR has now codified this model, along with its definition of safety culture [5], which inspectors should read alongside SAPs MS.1 to MS.4 to fully understand ONR’s safety culture expectations. If a dutyholder chooses to adopt this model as the basis for its safety culture assessment, then the dutyholder will be well-placed to demonstrate how it is tackling this important topic.

This TAG supports SAPs MS.1 to MS.4 by providing guidance to ONR’s inspectors on the expected standards for the self-assessment and independent assessment of safety culture, which are important for developing and maintaining a safety culture.

## WENRA Safety Reference Levels for Existing Reactors

ONR considers the WENRA Reference Levels (RL) to be relevant good practice for existing civil nuclear reactors [6] (refer also to section 4 of NS-TAST-GD-005 [7]).

RL C5.1. states:

“The senior management shall ensure that self-assessments and independent assessments (by an external organisation or by an internal independent assessment unit) are conducted regularly regarding safety culture, including the underlying attitudes and behaviours” [6].

This TAG supports RL C5.1. by providing guidance to ONR’s inspectors on the expected standards and frequency for the self-assessment and independent assessment of safety culture.

## IAEA Safety Standards

To ensure that it complies with its obligations under the Articles of the Convention on Nuclear Safety [8], the UK applies the IAEA Safety Standards and ensures that its own regulations, regulatory requirements, and guidance for UK nuclear facilities are consistent with them. Two overarching requirements and five subordinate requirements codified in IAEA General Safety Requirements No. GSR Part 2: Leadership and Management for Safety [9], are relevant here.

Requirement 12 of GSR Part 2: ‘Fostering a Culture for Safety’, codifies an overarching requirement that:

“Individuals in the organization, from senior managers downwards, shall foster a strong safety culture. The management system and leadership for safety shall be such as to foster and sustain a strong safety culture.” [9]

Requirement 14 of GSR Part 2: ‘Measurement, Assessment and Improvement of Leadership for Safety and of Safety Culture’*,* codifies an overarching requirement that:

“Senior management shall regularly commission assessments of leadership for safety and of safety culture in its own organisation.” [9]

Requirement 14 of GSR Part 2 also codifies five other requirements of relevance to this guide:

“Senior management shall ensure that self-assessment of leadership for safety and of safety culture includes assessment at all organisational levels and for all functions in the organisation.”

“Senior management shall ensure that such self-assessment makes use of recognised experts in the assessment of leadership and of safety culture.”

“Senior management shall ensure that an independent assessment of leadership for safety and of safety culture is conducted for enhancement of the organisational culture for safety (i.e., the organisational culture as it relates to safety and as it fosters a strong safety culture in the organisation).”

“The results of self-assessments and independent assessments of leadership for safety and of safety culture shall be communicated at all levels in the organisation.”

“The results of such assessments shall be acted upon to foster and sustain a strong safety culture, to improve leadership for safety and to foster a learning attitude within the organisation.” [9]

This TAG supports the UK’s obligations under the Articles on the Convention on Nuclear Safety by ensuring that the UK’s regulatory framework is consistent with Requirements 12 and 14 of GSR Part 2. It achieves this by providing guidance to inspectors of ONR’s expectations for how dutyholders should:

* Conduct both the self-assessment and independent assessment of safety culture.
* Communicate the results of safety culture assessments.
* Act upon the results of such assessments to foster a safety culture and improve safety outcomes.
* Use expertise when conducting safety culture self-assessments.

# Advice to inspectors

## Use of this guidance by inspectors

Inspectors should confirm that dutyholders conduct both self and independent assessments of safety culture which are proportionate to the hazard and risk profile of the site/organisation. Safety culture assessments are significant undertakings and therefore inspectors should strive to engage early with dutyholders to establish that they will conduct them to an adequate standard. They are also specialist in nature and therefore inspectors should seek support from those members of ONR’s Human and Organisational Capability (HOC) specialism that are fully conversant with the methods outlined in this guide.

The methods outlined in this guide are broadly consistent with those codified by the IAEA [10, 11] and academic/research communities, and therefore ONR considers them to be relevant good practice (RGP). Whilst inspectors should not interpret these methods as a prescriptive set of requirements, ONR does nevertheless expect dutyholders to adopt proportionate approaches to safety culture assessment and improvement that are consistent with RGP, such as the methods outlined herein. ONR expects its inspectors to make the following **overarching judgement:**

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| In the inspectors’ opinion has the dutyholder adopted an approach to safety culture assessment and improvement that is broadly consistent with RGP? |

It is ONR’s position that safety culture is a component of the wider organisational culture which has a set of underlying assumptions at its core. ONR considers an organisation to have established a safety culture when these underlying assumptions positively affect the value that individuals and groups at every level of the organisation place on safety, leading them to behave in ways that consistently emphasise safety over competing goals.

Dutyholders may choose to assess safety culture in its broadest sense, rather than focusing on just nuclear safety. ONR welcomes this approach however inspectors should confirm that such assessments adequately consider culture as it relates to nuclear safety alongside culture as it relates to conventional safety. This is because operating experience has shown that organisations with a conventional safety culture may not have a process safety culture [12], and therefore if an assessment is framed exclusively on conventional safety, the results may not reflect safety culture as it relates to nuclear safety.

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| Inspectors should confirm that a dutyholder’s safety culture assessment adequately considers culture as it relates to nuclear safety. |

Inspectors can achieve this by examining how a dutyholder frames safety throughout the safety culture assessment.

## Safety culture assessment process overview

Table 1 provides an overview of the safety culture assessment process described in this document.

Table 1 - Safety culture assessment process

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## Define safety culture

A dutyholder’s definition of safety culture is the starting point from which any safety culture assessment and subsequent improvements follow, and if safety culture is poorly defined, this may indicate that the dutyholder does not understand the subtleties of this complex construct. Many of the definitions found in academic literature, including the IAEA’s definition, omit essential elements of safety culture. ONR has, therefore, developed a definition which contains those elements that inspectors should explore when conducting their regulatory duties. ONR defines safety culture as:

“The underlying assumptions that underpin the value placed upon safety by every individual and group at every level of the organisation which interacts with the organisation’s structures and management systems resulting in behavioural norms that consistently emphasise safety over competing goals.”

This definition comprises of four interrelated elements which Figure 1 depicts:

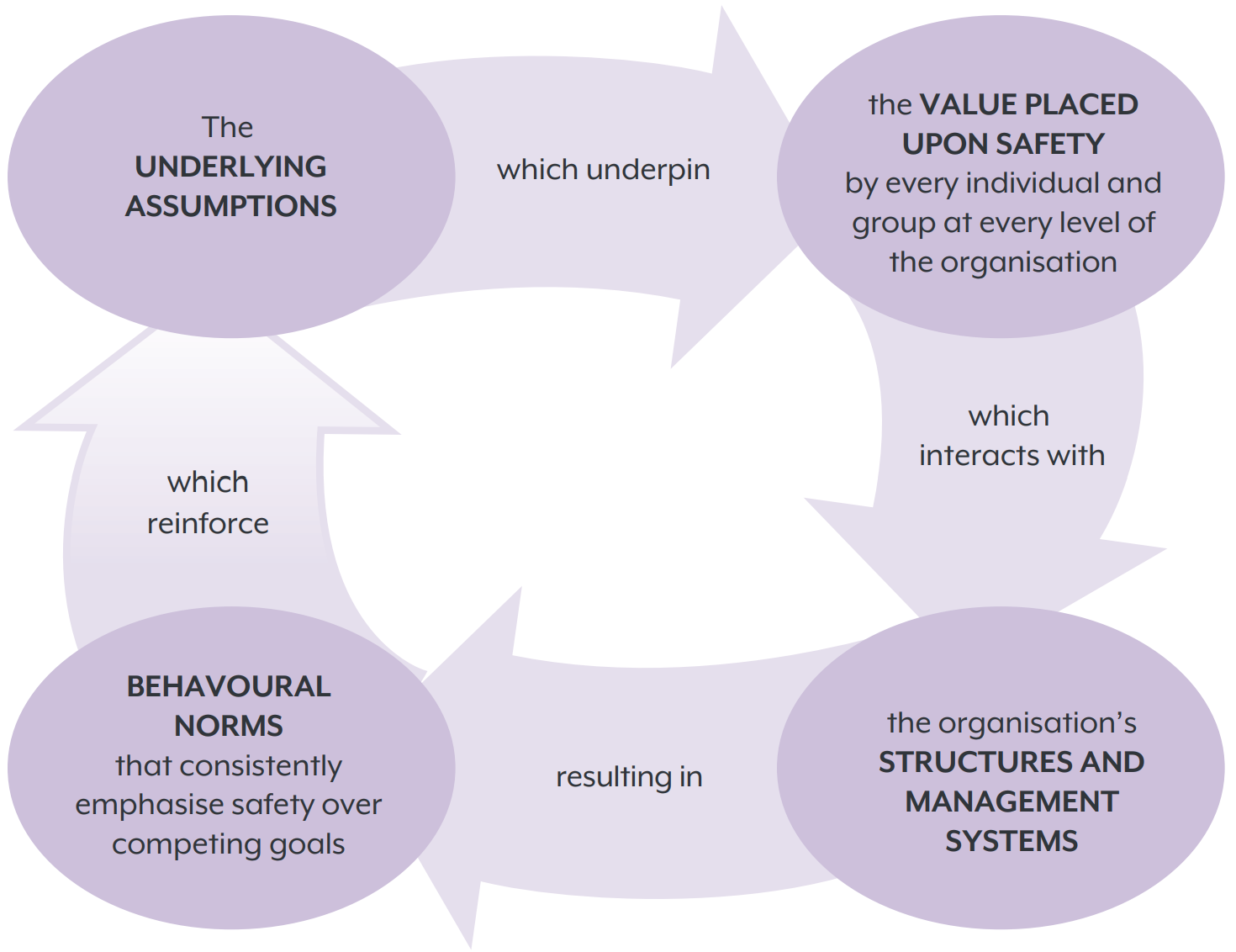


Figure 1 - The four interacting elements of ONR’s definition of safety culture.

An explanation of each of these four elements follows:

### The underlying assumptions

The underlying assumptions are unconscious and unspoken elements of the safety culture which are hard to articulate as people take them for granted. They often reflect ways of working which have been successful over time and manifest themselves in “the way we do things around here.” This is the most difficult element of the culture to uncover and understand, however assumptions have a profound impact on what individuals and groups value and how they behave.

### The value placed upon safety

One of the key factors that influences safety behaviour is the perceived priority that leaders/managers give to safety. At times, production pressures may result in leaders/managers prioritising production over safety and this can negatively influence safety behaviours: if workers feel that leaders/managers prioritise production over safety then workers are less likely to prioritise safety, resulting in lower safety compliance and lower safety participation. When there is a safety culture, the value placed upon safety by every individual and group at every level of the organisation is enduring. People consistently emphasise safety over competing goals and behave accordingly, reinforcing the safety culture.

### Structures and management systems

Structures include the formal organisational structures and hierarchies, as well as informal power structures which leaders/managers have not written down but often underpin how people make decisions within a team/organisation. Management systems include policies, standards, procedures, and arrangements; for example, arrangements for reward and recognition, managing performance, dealing with disciplinary matters, and making decisions. Structures and management systems profoundly affect how people behave, and therefore it is important that leaders/managers design structures and management systems which enable the behaviours that underpin a safety culture.

### Behavioural norms

Behavioural norms are social rules that influence how people behave within a team/organisation. They are ways of working which people accept and can be a powerful force in influencing behaviour. In a safety culture, the behavioural norms are patterns of behaviours that are associated with safe outcomes, for example acting upon warning signs of danger, responding positively to feedback and ideas regarding safety, or challenging unsafe behaviours. People deem behaviour which is inconsistent with a behavioural norm to be socially unacceptable, and they apply social pressure to ensure that the person exhibiting the behaviour brings it back in line with the social rules.

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| Inspectors should confirm that a dutyholder’s understanding of safety culture encompasses each of these four interrelated elements. |

## Choose a model of safety culture

When undertaking safety culture assessments, dutyholders will normally use a model of safety culture to provide a framework upon which to structure an assessment’s findings. ONR has found that dutyholders use different models to aid them in understanding and assessing safety culture which makes it challenging for them to accurately benchmark their results with one another. This may result in them missing opportunities to gain experience from each other.

Dutyholders’ choices of safety culture models and the contexts in which they use them can affect the quality of safety culture assessments, particularly if a model does not accurately capture the construct of safety culture. For example, a model may omit some important dimensions of safety culture, or it may include other aspects which are more associated with safety outcomes rather than safety culture itself.   
Furthermore, a model developed in another context such as another industry or another nation, may not be generalisable to GB’s nuclear context.

To address this, ONR commissioned research to develop a state-of-the-art model of safety culture, and an accompanying measure, uniquely suited to GB’s nuclear industry. The result of this research is the Nuclear Industry Safety Culture Inventory (NISCI) [4]. All 17 organisations which at the time operated, or conducted operations on, GB’s 35 licensed nuclear sites, participated in the research, thereby contributing to its development. ONR considers this model to capture safety culture most accurately in GB’s nuclear industry and ONR has now codified this model in its publication: Safety Culture – Definition and Model [5]. The NISCI has six dimensions, two of which relate to leadership, and therefore dutyholders that use it will be well placed to demonstrate how they meet Requirement 14 of IAEA GSR Part 2 which requires dutyholders to conduct assessments of both safety culture **and** safety leadership [9].

The NISCI also provides dutyholders with an effective and efficient way to accurately benchmark their safety cultures and learn from each other. ONR considers it important that dutyholders develop an understanding of their safety culture relative to other GB-based nuclear organisations so that they may both learn from the good practices of others within their national industry and allow others to learn from theirs.

For the reasons outlined above, inspectors should encourage dutyholders to use the NISCI model and measure to undertake safety culture assessments, however, inspectors should not prescribe its use. Should a dutyholder choose to use an alternative model, then an inspector should confirm that the dutyholder can articulate its rationale for its choice of model and demonstrate that it is has taken adequate steps to ensure that the model accurately captures the target construct of safety culture. Such steps would normally entail a comprehensive literature review and interviews with safety culture experts.

ONR considers the IAEA’s Harmonised Safety Culture Model to be an alternative suitable model for dutyholders to adopt, however inspectors should be aware of the limitations of surveys based upon the IAEA model’s structure as these may lack validity: academic research has highlighted that several of the attributes of the IAEA model do not relate to their corresponding dimension [13]. An earlier study of the IAEA’s five-dimensional safety culture model drew similar conclusions [14].

ONR recognises that some dutyholders have parent companies that require them to participate in group-wide safety culture surveys using a parent company provided model and/or survey tool. Some dutyholders may also wish to use models and surveys that provide wider benchmarking opportunities beyond nuclear, such as the HSE’s Safety Climate Tool. ONR encourages dutyholders who must, or choose to use, other models and surveys, to use these alongside the NISCI, on a rotating basis.

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| Inspectors should confirm that:   * A dutyholder has taken appropriate steps to ensure that its choice of model accurately captures the target construct of safety culture. * The model includes leadership dimensions or attributes. |

## Design the safety culture assessment

Prior to commencing safety culture assessments, dutyholders will first need to consider which data collection methods they will adopt, how they will combine these, and what they will sample.

### Selecting and combining data collection methods

Dutyholders’ choices of data collection methods and how they will sequence and combine these can affect the quality of safety culture assessment. Dutyholders can collect data using either:

* Quantitative methods (surveys).
* Qualitative methods (document analysis, interviews, focus-group interviews, and observations).

One of the most common and effective ways that dutyholders may sequence data collection is by adopting a technique known as sequential explanatory analysis. This mixed method consists of two distinct phases: a quantitative data collection phase followed by a qualitative data collection phase:

* In this first phase, the dutyholder collects and analyses quantitative data to provide a general understanding of the safety culture.
* In this second phase, the dutyholder collects and analyses qualitative data to explain or elaborate on the quantitative results by exploring peoples’ views in greater depth.

ONR considers this approach to be well suited to safety culture assessment however ONR acknowledges that dutyholders may sequence and combine data collection methods in other ways. Notwithstanding this, it is ONR’s position that:

* A safety culture assessment is most effective when it uses a suitable combination of both quantitative **and** qualitative methods.
* A safety culture assessment comprising of quantitative data collection without a qualitative element is, in most cases, unlikely to meet the required standard.

An exception to this second point is when the dutyholder repeats a survey to track improvement, which follows on from an earlier assessment that comprised of both quantitative and qualitative methods. In this instance, a follow-up assessment comprising of a quantitative-only approach may be appropriate.

Dutyholders may wish to add in some free text questions to a survey to enable them to gather large volumes of qualitative data alongside the quantitative survey data. Dutyholders would normally analyse this qualitative data in a second phase alongside all other qualitative data.

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| Inspectors should confirm that a dutyholder:   * Uses both quantitative and qualitative methods. * Sequences and combines methods in a logical way which supports the assessment’s aims. |

### Overarching design principle

ONR considers it important that a dutyholder’s assessment design addresses all four inter-related elements outlined in ONR’s definition of culture [5], as follows:

* The underlying assumptions.
* The value placed upon safety.
* Structures and management systems.
* Behavioural norms.

A well-designed assessment comprising of both quantitative and qualitative methods, as outlined in section 5.5.1, is a key enabler for this. Should an inspector find that a dutyholder has failed to address one or more of these four elements in its assessment design and/or execution, then this is likely to indicate that the dutyholder’s safety culture assessment may not meet the required standard.

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| Inspectors should confirm that a dutyholder designs and executes its safety culture assessment in such as way that it adequately addresses all four inter-related elements outlined in ONR’s definition of culture. |

### Determining the sample

What to sample depends very much upon which data collection methods dutyholders have chosen to use and how they intend to combine these. If, for example, dutyholders wish to gather the views of most of the workforce, then surveys are an efficient way to achieve this. Indeed, GSR Part 2 codifies a requirement that:

“Senior management shall ensure that self-assessment of leadership for safety and of safety culture includes assessment at all organisational levels and for all functions in the organisation” [9].

It follows that in large organisations particularly, dutyholders can use surveys as an efficient means of reaching much of the workforce, thereby demonstrating how they have met this requirement.

Dutyholders can calculate survey sample sizes by using widely available online tools which require details of the population size, the acceptable margin of error, and the desired confidence level [15]. For example, for a population of 1000 people, with a margin of error of 5% and a confidence level of 99%, the ideal sample size is 400 respondents. It is, however, normal practice for dutyholders to send safety culture surveys to the entire population that is the subject of the assessment: often the entire workforce. When dutyholders adopt this approach, ONR considers an adequate survey completion rate to be >30%.

Qualitative data collection methods require a different approach as it would be neither practical nor necessary to use these methods to collect data from the entire population which is the subject of the assessment. Sampling in qualitative research is concerned with gaining insight rather than representativeness. This involves selecting cases and participants in a strategic way and from multiple sources to enhance the credibility of any insights found. Inspectors should confirm that dutyholders do not rely solely on volunteers as people who choose not to volunteer often hold views which are of high value to the safety culture assessment. To avoid this, dutyholders can send out targeted invites to those people from which they believe they can gain the most insight from. This is known as ‘purposeful sampling.’

With qualitative data collection, sampling should continue until those collecting the data are unable to generate further insights; known as ‘saturation’ this indicates that the sample size is adequate. The number of interviews (or focus group interviews) required to achieve saturation will vary from assessment to assessment; the research skills of those conducting the data collection will also affect this number – a more experienced researcher will be able to elicit more insights from a smaller data set. As an approximate guide, eight focus group interviews or 16 one-to-one interviews may be sufficient for an experienced safety culture assessor to achieve saturation. In some circumstances it may be acceptable for dutyholders to reduce these numbers when they combine these methods, however too great a reduction may adversely impact upon the dependability and credibility of the insights gained. In some circumstances dutyholders may need to plan a larger sample size from the outset, for example organisations with multiple sites.

If at the end of the planned sampling those collecting the data find that they are still uncovering insights relevant to safety culture, then they should undertake further sampling by expanding the sample size until they achieve saturation.

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| Inspectors should confirm that a dutyholder:   * Has set an adequate survey completion rate target for the quantitative phase. * Has selected adequate sample sizes for the qualitative phase. * Has not relied solely on volunteers. * Has adopted a purposeful sampling strategy. * Has documented the measures it will take to achieve saturation. |

## Write a safety culture assessment plan

ONR considers it to be good practice that prior to dutyholders undertaking safety culture assessments, they write down their planned approach. Table 2 shows the typical contents of an assessment plan.

Table 2 - Typical assessment plan contents

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| **Assessment plan contents** | |
| * Key lessons from the last safety culture assessment. * The dutyholder’s definition of safety culture. * The choice of safety culture model and the rationale for its choice. * How it will meet the overarching design principle. * Which data collection methods it has chosen and how it will sequence and combine these. * The sampling strategy for both the quantitative and qualitative phases. | * An acknowledgement of the importance of achieving saturation during the qualitative phase of data collection and what measures it will take to ensure that it achieves it. * The method(s) it intends to use for analysing the data. * The competency requirements for all individuals conducting the assessment. * Interview schedule. * List of documents for analysis. * Communications plan. |

If a dutyholder’s assessment plan omits some of the content shown in Table 2, then this may indicate that the dutyholder has not adequately planned the assessment.

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| Inspectors should confirm that a dutyholder’s assessment plan adequately addresses the typical content. |

## Collect the data

Dutyholders will normally collect data using a combination of quantitative methods (surveys) and qualitative methods (document analysis, interviews, focus-group interviews, and observations).

### Surveys

Surveys are an efficient way of gathering the views of much of the workforce.   
They often ask people to rate, on a five-point Likert type scale, their responses to a series of questions, ranging from strongly agree to strongly disagree, and they enable dutyholders to filter and analyse the results by demographic groupings to see how safety culture varies across an organisation. Dutyholders can also repeat a survey over time to track progress. Appendix A contains fuller guidance on surveys.

### Document analysis

Document analysis is a systematic method for evaluating or reviewing documents that those conducting safety culture assessments often conduct early on to help shape its focus and design. It involves skimming, reading, and interpreting documentation. Document analysis may provide insights into hierarchy, power, authority, the degree to which safety controls are formalised, and how people value and prioritise safety. Documents may be current, historic, private, publicly available, strategic, or tactical. Appendix B contains fuller guidance on document analysis.

### Interviews

Interviews are the most widely used qualitative data collection method. There are two main types of interviews: unstructured and semi-structured. In an unstructured interview an interviewer uses a short aide-memoire covering a range of topics and retains a great degree of flexibility in what to ask and when. The aim is to generate a conversation and a rich discussion about the interview topics. In a semi-structured interview, the interviewer develops and uses a pre-prepared interview guide to give greater structure to the interview. Appendix C contains fuller guidance on interviews.

### Focus group interviews

A focus group interview is a type of group interview that seeks the opinions of several people about an issue or topic. They allow an interviewer to examine how a group of people interprets and makes sense of topics of interest to safety culture. Interviewers may observe group members probing and challenging each other’s reasons for holding a view, offering different perspectives, voicing their agreements and disagreements, or justifying the reasons for their views. This group interaction produces more fully articulated accounts, and provides interviewers with insights into diversity of perspectives, collective sense-making, and the opportunity to observe culture in action: something which an interviewer cannot easily attain by other methods. Appendix D contains fuller guidance on focus group interviews.

### Observations

Observations involve going into a workplace, watching what people do, and describing, analysing, and interpreting what one has seen. This could be observing day-to-day operations at a dockside, observing shift changeovers in a power-plant control room, or observing a board meeting. An observer can undertake unstructured or structured observations. Unstructured observations focus upon what people do and how they talk and interact, whereas structured observations focus on pre-specified tasks. Appendix E contains fuller guidance on observations.

## Analyse the data

Quantitative data and qualitative data differ in their nature, as shown in   
Table 3. Because of this, analysis methods for each data type differ considerably.

Table 3 - Quantitative data, compared with qualitative data.

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| Quantitative data | Qualitative data |
| * Is numerical: expressed in numbers. * Is concerned with things that people can quantify. * Provides insights into, for example, how much someone perceives something or how often something occurs. * Researchers use statistical analysis techniques. | * Is descriptive: expressed in words and language. * Is concerned with things that people can observe. * Provides insights into, for example, why people behave in a particular way, or how people do things. * Researchers group the data into themes and explore their meaning. |

### Quantitative data analysis

Quantitative data analysis methods help safety culture assessors to examine, interpret, and draw meaningful conclusions from numerical data. Safety culture assessors may analyse such data by, for example, exploring how results vary across demographic groupings such as location (site/facility), function, role type, age, and tenure. Often, they use the insights they gain to better target their subsequent qualitative data collection. Appendix F contains fuller guidance on quantitative data analysis.

### Qualitative data analysis

Qualitative data analysis methods help safety culture assessors to make sense of large volumes of content. One of the most common methods that safety culture assessors use to achieve this is thematic analysis, a method for identifying themes that occur repeatedly across a dataset which are of importance to the safety culture assessment’s aims. ONR has found that a form of thematic analysis known as ‘template analysis’ is well suited to safety culture assessments that use a model of safety culture. Appendix G contains fuller guidance on qualitative data analysis.

## Communicate the findings

Inspectors should confirm that dutyholders have communicated the safety culture assessment findings widely and have informed all levels of worker of the results. Using methods such as seminars or workshops encourage interaction, give people the opportunity to reflect upon the findings, and help people to develop a shared understanding of their meaning. This communication usually occurs in two stages:

* **Stage one: communication to senior management**. Inspectors should confirm that the safety culture assessment team have communicated the findings to senior management in such a way that generates dialogue and establishes senior management commitment to both the findings and the need for action.
* **Stage two: communication to the broader organisation**. Inspectors should confirm that senior management has communicated the findings to workers in such a way that generates dialogue and establishes worker commitment to both the findings and the need for action. It is important that senior management leads these sessions as this demonstrates management safety commitment to the workforce. Safety culture assessment team members normally attend these sessions to support senior management and to answer any detailed questions. Senior management may also supplement these interactive methods with more traditional methods such as videos, podcasts, blogs, staff bulletins and intranet news articles.

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| Inspectors should confirm that a dutyholder’s communication of the findings to the workforce:   * Is senior management led. * Encourages interaction and reflection. * Encompasses workers at all levels of the organisation. |

## Act upon the results

Inspectors should confirm that dutyholders act upon the results of the assessment, by developing impactful actions, creating the conditions for success, and managing action plans appropriately.

### Developing impactful actions

Actions should not be superficial, and instead they should address systemic factors which may be responsible for a range of undesired outcomes rather than the symptoms of problems. To be able to translate findings into impactful actions, inspectors should confirm that dutyholders have educated their senior management teams in the systemic approach to safety, which emphasises the interaction between humans, technology, and the organisation [9], and that they use multidisciplinary cross-functional teams which include safety culture experts knowledgeable in behavioural sciences/organisational psychology to assist in understanding complex cultural factors and the implications of these on safety.

### Creating the conditions for success

Inspectors should confirm that dutyholders have created the conditions for safety culture improvements to be successful. They should confirm that senior management are actively committed to improving the safety culture, and that they have engaged with workers at all levels to develop actions; this is important to establish worker commitment to the required changes.

Inspectors should confirm that dutyholders have established a mutual understanding of safety and of safety culture amongst all its workforce, that workers understand the radiation risks and hazards that they face, the control measures in place, and why these control measures are important for their safety. Workers should also understand how their work may impact upon the safety of others and recognise and accept that they are personally responsible for their safe conduct within the workplace and their role in improving the safety culture.

Inspectors should confirm that dutyholders have put in place management champions and worker advocates for safety culture improvements and have established reward systems that support long-term safety improvements.

### Managing the actions

Inspectors should confirm that dutyholders manage their action plans adequately. Some dutyholders may choose to create a dedicated safety culture improvement plan, whereas others may choose to manage safety culture improvement actions via their management system’s action tracking arrangements. The scale and complexity of the resulting actions will be dependent upon the scope of the safety culture assessment, the competence of the assessment team, and the safety culture of the dutyholder. ONR considers the adoption of programme management and/or project management techniques and the support of a programme manager and/or a project manager to be key enablers for more complex or wide-ranging improvement plans. Both programme management and project management incorporate techniques such as benefits management and benefits realisation which are important for ensuring programme/project success.

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| Inspectors should confirm that a dutyholder:   * Creates actions that address systemic factors rather than the symptoms of problems. * Has educated its senior management team in a systemic approach to safety, which emphasises the interaction between humans, technology, and the organisation. * Uses multidisciplinary cross-functional teams which include safety culture experts knowledgeable in behavioural sciences/organisational psychology to assist in understanding complex cultural factors and the implications of these on safety. * Has a senior management team that is actively committed to improving the safety culture. * Co-develops actions with workers at all levels. * Has developed a mutual understanding of safety and of safety culture amongst all its workforce. * Has ensured that all its workers understand the radiation risks and hazards that they face, the control measures in place, and why these control measures are important for their safety. * Has ensured that all its workers understand how their work may impact upon others and recognise and accept that they are personally responsible for their safe conduct within the workplace and their role in improving the safety culture. * Has put in place management champions and worker advocates for safety culture improvements. * Has established reward systems that support long-term safety improvements. * Adequately manages the safety culture improvement plan, adopting programme management or project management techniques for complex or wide-ranging improvement plans. |

## Review, learn and improve

Inspectors should confirm that once the safety culture assessment is complete, a dutyholder undertakes a Review, Learn, and Improve (RLI) exercise in accordance with its arrangements for conducting RLI as set out in its management system. An effective RLI should consider: (1) what went well and why; (2) what did not go well and why; and (3) key lessons for future safety culture assessments. Inspectors should encourage dutyholders to share the RLI findings with others via the Safety Directors’ Forum’s Safety Culture Sub-Group to enable cross-industry learning.

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| Inspectors should confirm that a dutyholder:   * Has conducted, or plans to conduct, an RLI. * Has implemented the key lessons of the last assessment into the design and execution of the current assessment. |

## Independent assessment

Inspectors should confirm that dutyholders have commissioned independent safety culture assessments. For an assessment to be truly independent, those undertaking the assessment should be culturally distinct from the dutyholder. This is because people working within a culture are part of it; they share the assumptions which unconsciously shape their behaviour and can find it hard to uncover or articulate these. For this reason, inspectors will often find management consultancies or academic institutions conducting independent assessments. However, they may also encounter other bodies conducting them such as:

* **Peer assessment teams**. These may comprise of representatives of other dutyholders who provide an independent service in a reciprocal arrangement. This option has the added benefit of developing capabilities within dutyholder organisations rather than reliance upon the supply chain.
* **The IAEA**. The IAEA conducts Independent Safety Culture Assessment (ISCA) peer reviews. The IAEA also conducts Operational Safety Review Team (OSART) Missions which may include a safety culture assessment within their scope; however, inspectors should note that not all OSART Missions do.

ONR should confirm that where a dutyholder has chosen to commission its internal regulation (or similar) function to conduct an independent assessment, it has taken steps to introduce an appropriate degree of cultural independence to the assessment team. A dutyholder may achieve this by, for example, supplementing the assessment team’s membership with one or more external members who are culturally distinct from the organisation to assure a greater degree of independence.

Inspectors should confirm that a dutyholder acts as an intelligent customer by specifying the independent assessment to ensure that the body conducting it uses approaches consistent with RGP such as the methods outlined herein, supervising the independent assessment, reviewing its output. By acting as an intelligent customer, the dutyholder must not unduly influence the independence of the assessment.

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| Inspectors should confirm that a dutyholder:   * Has selected a body to conduct the independent assessment which has an appropriate degree of cultural independence. * Has specified the independent assessment to ensure that the body conducting it uses approaches consistent with RGP, such as the methods outlined herein. * Has supervised the independent assessment. * Has reviewed its output. * Has not unduly influenced the independence of the assessment. |

## Capability – competence and capacity

The IAEA, has established a requirement that:

“Senior management shall ensure that such self-assessment makes use of recognised experts in the assessment of leadership and of safety culture.” [9]

Whilst ONR supports the IAEA’s requirement for the use of experts in safety culture assessment, ONR does not consider the ‘recognition’ element of the IAEA’s requirement to be appropriate for GB’s nuclear industry. This is because a person may attain recognition as an expert due to their ability to market themselves more so than their knowledge and skills.

ONR considers an expert to be a suitably qualified and experienced person with deep knowledge and advanced skills relating to safety culture assessment. Such experts will typically hold a qualification in organisational psychology, be fully conversant with safety culture theory and practice, and be skilled in the application of applied research methods.

ONR does not prescribe how dutyholders should make use of experts, however it is incumbent upon dutyholders to make use of such experts and to demonstrate to ONR how they have gone about this. They may, for example:

* Directly employ a safety culture lead with the requisite expertise, such as a suitably qualified and experienced organisational psychologist.
* Engage the services of an academic partner to provide qualitative methods training to the assessment team.
* Engage the services of an organisational psychology consultancy to provide expert advice throughout the assessment.
* Engage the services of the IAEA’s experts by participating in the IAEA’s Safety Culture Continuous Improvement Process [16].

In addition to the use of experts, inspectors should also confirm that only suitably qualified and experienced persons perform safety culture assessments. Such a person may typically be familiar with basic organisational psychology theory and concepts, have a good working knowledge of safety culture theory and practice, and be able to collect and analyse data using a range of applied research methods under the supervision of an expert.

Inspectors should confirm that dutyholders provide and maintain adequate financial and human resources for both conducting the assessments and addressing the findings which arise from them. Inspectors should also confirm that dutyholders have included safety culture assessor posts and/or roles on their nuclear baselines.

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| Inspectors should confirm that a dutyholder:   * Has made use of suitably qualified and experienced safety culture experts. * Has ensured that only suitably qualified and experienced persons will conduct safety culture assessment. * Has adequate financial and human resources for both conducting the assessments and addressing the findings arising from them. * Has included safety culture assessor posts and/or roles on its nuclear baseline. |

## Frequency of assessments

Some dutyholders may incorporate their safety culture assessment methodology into a management systems arrangements document, whereas others may make a commitment to periodically undertake safety culture assessment in a policy document, supported by a management standard which provides broad expectations of what such an assessment must entail. ONR does not seek to prescribe how dutyholders codify their approach to safety culture assessment, however ONR considers it important that dutyholders include within their management systems arrangements which initiate safety culture assessments at an appropriate frequency.

The frequency at which dutyholders should undertake safety culture assessments is for dutyholders to determine. However, ONR has established minimum expectations and inspectors should confirm that dutyholders are meeting these:

* Comprehensive self-assessments, comprising of both quantitative and qualitative methods – once every five years.
* Comprehensive independent assessments, comprising of both quantitative and qualitative methods – once every ten years.
* Continual assessment, for example a short pulse survey – once per year.

As means of an example, the NISCI comprises of three survey lengths:

* Full-form – 60 items.
* Short form – 30 items.
* Super-short form – 15 items.

Table 4 shows a typical self-assessment schedule designed to minimise survey fatigue.

Table 4 - A typical self-assessment schedule

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| Year 1 | Year 2 | Year 3 | Year 4 | Year 5 |
| Full form survey (60 items) and qualitative data collection | Super-short form survey (15 items) | Short form survey (30 items) | Super-short form survey  (15 items) | Full form survey (60 items) and qualitative data collection |

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| Inspectors should confirm that a dutyholder has included within its management system, arrangements which initiate safety culture assessments at the following frequency:   * A comprehensive self-assessment at least once every five years. * A comprehensive independent assessment at least once every ten years. * Continual assessment once per year.   Inspectors should also confirm that a dutyholder is conducting safety culture assessments at the frequencies set out in its management system. |

## Inspector aide-mémoire

Inspectors can find an aide-mémoire at Appendix H which provides them with a useful checklist to aid them when conducting assessments of dutyholders’ approaches to safety culture assessment and improvement.

# References

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| [1] | ONR, “Safety Assessment Principles (SAPs) for Nuclear Facilities - 2014 Edition (Revision 1),” 2020. [Online]. Available: https://www.onr.org.uk/media/pobf24xm/saps2014.pdf. |
| [2] | ONR, “Licence Condition Handbook,” 2017. [Online]. Available: https://www.onr.org.uk/media/gixbe2br/licence-condition-handbook.pdf. |
| [3] | ONR, “NS-TAST-GD-050 - Periodic Safety Review,” 2022. [Online]. Available: https://www.onr.org.uk/media/documents/guidance/ns-tast-gd-050.docx. |
| [4] | Alliance Manchester Business School, “Development of a nuclear industry safety culture inventory (NISCI),” 2024. [Online]. Available: https://www.onr.org.uk/media/kajllz4y/ambs-onr-nisci-report.pdf. |
| [5] | ONR, “TD-HOC-GD-003 - Safety Culture: Definition and Model,” 2024. [Online]. |
| [6] | WENRA, “WENRA Safety Reference Levels for Existing Reactors Revision 2020,” 2020. [Online]. Available: https://www.wenra.eu/sites/default/files/publications/wenra\_safety\_reference\_level\_for\_existing\_reactors\_2020.pdf. |
| [7] | ONR, “NS-TAST-GD-005 - Regulating duties to reduce risks to ALARP,” 2024. [Online]. Available: https://www.onr.org.uk/media/documents/guidance/ns-tast-gd-005.docx. |
| [8] | Department for Business, Energy and Industrial Strategy, “The United Kingdom’s Ninth National Report on Compliance with the Convention on Nuclear Safety,” BEIS, London, 2022. |
| [9] | International Atomic Energy Agency, “Safety Standard – General Safety Requirements No. GSR Part 2 – Leadership and Management for Safety,” 2016. [Online]. Available: https://www.iaea.org/publications/11070/leadership-and-management-for-safety. |
| [10] | International Atomic Energy Agency, “Services Series No. 32 - OSART Independent Safety Culture Assessment (ISCA) Guidelines,” 2016. [Online]. Available: https://www-pub.iaea.org/MTCD/Publications/PDF/SVS-32\_web.pdf. |
| [11] | International Atomic Energy Agency, “Safety Reports Series No. 83 - Performing Safety Culture Self-assessments,” 2016. [Online]. Available: https://www-pub.iaea.org/MTCD/Publications/PDF/Pub1682\_web.pdf. |
| [12] | J. A. Baker, G. Erwin, S. Priest, P. V. Tebo, I. Rosenthal, F. L. Bowman, D. Hendershot, N. Leveson, L. D. Wilson, S. Gorton and D. A. Wiegmann, “The Report of the U.S. Refineries Independent Safety Review Panel,” 2007. |
| [13] | M. Martinez-Corcoles , D. Seitkanova, I. Silla and F. J. Gracia, “Testing the Validity of the IAEA’s Harmonized Model of Safety Culture,” in *21st European Association of Work and Organisational Psychology Conference*, Katowice, Poland, 2023. |
| [14] | B. L. de Castro, F. J. Gracia, J. M. Peiró, L. Pietrantoni and A. Hernandez, “Testing the validity of the International Atomic Energy Agency (IAEA) safety culture model,” *Accident Analysis & Prevention,* vol. 60, pp. 231-244, 2013. |
| [15] | Qualtrics, “Sample size calculator,” [Online]. Available: https://www.qualtrics.com/blog/calculating-sample-size/#:~:text=If%20you%20want%20an%20easier,size%20is%20calculated%20for%20you. |
| [16] | International Atomic Energy Agency, “Safety Culture Continuous Improvement Process (SCCIP),” [Online]. Available: https://www.iaea.org/services/review-missions/safety-culture-continuous-improvement-process-sccip. |
| [17] | ONR, “Nuclear Industry Safety Culture Inventory,” [Online]. Available: https://tools.onr.org.uk/Interview/198e66ce-fd6f-4958-a299-1ab1b887f5f4. [Accessed 23 April 2025]. |
| [18] | HSE, “Safety Culture Tool (SCT),” [Online]. Available: https://books.hse.gov.uk/Safety-Climate-Tool/. |
| [19] | ONR, “TD-HOC-GD-001: Methods for Assessing Culture and Diagnosing Organisational Problems,” [Online]. Available: https://www.onr.org.uk/media/documents/guidance/td-hoc-gd-001.docx. |

# Appendix A - Surveys

Surveys are an efficient way of gathering the views of much of the workforce. They often ask people to rate, on a five-point Likert type scale, their responses to a series of statements, ranging from strongly agree to strongly disagree, and they enable dutyholders to filter and analyse the results by demographic groupings to see how safety culture varies across an organisation. Dutyholders can also repeat a survey over time to track progress.

A survey must be both accurate (it measures what it purports to measure) and appropriate (the measure is useful). It takes considerable academic rigour to develop such a measure, for example:

* **Scale development** steps may include reviewing existing scales, conducting item generation interviews with industry experts, and conducting response process interviews with a sample of target users.
* **Scale evaluation** steps may include confirmatory factor analysis (to confirm model fit, convergent validity, and discriminant validity) and predictive validity testing.

**These steps are important because the use of flawed measures may lead to flawed safety decisions.**

ONR inspectors have encountered safety culture surveys in use in the nuclear industry which lack psychometric rigour in their scale development and/or scale evaluation. Users cannot, therefore, be certain that these tools are measuring safety culture or that they are useful, for example they may not predict important safety outcomes.

To improve the measurement of safety culture, ONR commissioned research to develop a model of measure of safety culture. Known as the Nuclear Industry Safety Culture Inventory (NISCI), the NISCI is the most rigorously developed and psychometrically validated safety culture survey tool available in the nuclear industry to date [4], and therefore ONR recommends that dutyholders use the NISCI as a quantitative means of measuring their safety cultures, alongside qualitative methods. To aid dutyholders, ONR has developed a software tool which dutyholders can use to access the survey [17].

Dutyholders are free to use other safety culture measures however if their developers have not applied a similar degree of scale development and/or scale evaluation, then they may not accurately measure what they set out to measure and may not be useful. In some circumstances, this may result in dutyholders making flawed safety decisions.

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| Inspectors should confirm that a dutyholder’s choice of survey has undergone adequate scale development and scale evaluation. |

# Appendix B - Document analysis

Document analysis is a systematic method for evaluating or reviewing documents that those conducting safety culture assessments often conduct early on to help shape a safety culture assessment’s focus and design. It involves skimming, reading, and interpreting documentation. Document analysis may provide insights into hierarchy, power, authority, the degree to which safety controls are formalised, and how people value and prioritise safety. Documents may be current, historic, private, publicly available, strategic, or tactical.

Dutyholders may choose to undertake document analysis early in the qualitative phase of a safety culture assessment to assist with the development of interview and observation guides. Dutyholders can also analyse documents concurrently with other data collection methods as a means of gathering a wider data set for subsequent analysis. Table 5 shows examples of typical documents of interest to safety.

Table 5 - Typical documents of interest to safety.

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| **Documents** | |
| * Mission/purpose, vision, and values. * Business strategy. * Annual reports. * Company website. * Job adverts. * Employee socialisation arrangements. * Safety policy. * Results of the Nuclear Industry. Safety Culture Inventory (NISCI) or other safety culture surveys. * Results of employee engagement surveys. * Organisational charts. * Committee meeting terms of references and minutes. * Job/role descriptions. * Safety performance indicators policy and data. | * Performance management policy. * Behaviours framework. * Performance appraisal forms (for safety objectives). * Leadership development policy, training materials and data. * Safety decision making processes. * Visible leadership/leader in the field programmes. * Just culture policy, arrangements, and data. * Disciplinary policy, arrangements, and data. * Reward and recognition policy. * Workplace risk assessments. * Work instructions. * Accident/incident investigation data and reports. |

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| Inspectors should confirm that a dutyholder:   * Has selected appropriate documents to analyse. * Has adequately considered how it will combine the output of document analysis with the other data collection methods. |

# Appendix C - Interviews

Interviews are the most widely used qualitative data collection method. There are two main types of interviews: unstructured and semi-structured. In an unstructured interview an interviewer uses a short aide-memoire covering a range of topics and retains a great degree of flexibility in what to ask and when. The aim is to generate a conversation and a rich discussion about the interview topics. In a semi-structured interview, the interviewer develops and uses a pre-prepared interview guide to give greater structure to the interview. Interview guides comprise of a list of questions on the topics that an interviewer intends to cover and normally the interviewer will ask all the questions in the guide during the interview. The interviewer may also ask questions that they have not included in the interview guide as they respond dynamically to the interviewee’s answers. In both types of interviews, the interviewee retains a great degree of freedom in how they respond.

The choice of which method to use depends upon the following two factors:

* **Level of understanding**. When the interviewer has a clear understanding of the information sought and knows what topics they want to address, they should choose to undertake semi-structured interviews, whereas when the interviewer has less of an understanding of the information sought and wants to gather initial data to properly frame further data collection, they should choose to undertake unstructured interviews.
* **Degree of comparability**. When more than one interviewer is undertaking interviews, it is preferable to undertake semi-structured interviews as the use of the interview guide makes it easier to compare the data gathered by each interviewer.

Interviews are an important part of the qualitative phase of a safety culture assessment and are an effective tool to gather data which may explain or elaborate on the results of a survey.

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| Inspectors should confirm that a dutyholder:   * Has adequately considered the types of interviews (unstructured or semi-structured) it intends to undertake. * Has identified who it intends to interview (adopts a purposeful sampling strategy; does not rely solely on volunteers) – see also section 5.5.2. * Has chosen to conduct enough interviews (an appropriate sample size) - see also section 5.5.2. |

# Appendix D - Focus group interviews

A focus group interview is a type of group interview that seeks the opinions of several people about an issue or topic. They allow an interviewer to examine how a group of people interprets and makes sense of topics of interest to safety culture. Interviewers may observe group members probing and challenging each other’s reasons for holding a view, offering different perspectives, voicing their agreements and disagreements, or justifying the reasons for their views. This group interaction produces more fully articulated accounts, and provides interviewers with insights into diversity of perspectives, collective sense-making, and the opportunity to observe culture in action: something which an interviewer cannot easily attain by other methods.

A focus group interview normally involves small groups of 6 to 12 participants and a moderator who manages the interview process and facilitates group discussion. Dutyholders would normally form smaller sized groups when the topics are sensitive or controversial, or when they seek detailed personal accounts, whereas they would normally form larger sized groups when they seek numerous brief suggestions.   
ONR considers it prudent that dutyholders over-recruit in anticipation of no-shows.

Focus group interviews can take a topic-based approach using a short aide-memoire like those used for unstructured interviews, or a question-based approach using an interview guide like those used for semi-structured interviews. As it is a method of interview, much of the guidance in the earlier section on interviews is also relevant here.

The mix of participants is an important consideration. A homogenous group is one where all participants are of a similar kind: they may all be front-line workers, or all health physicists, or all middle managers. A heterogeneous group is one where participants differ in some way: they may be from different professional disciplines, different sites, or be of different hierarchical grades. Dutyholders must give careful thought to the mix of the participants in the group to not stifle debate, for example a homogenous group where all workers are of the same grade may elicit more honest responses than a heterogenous group with participants of differing grades.

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| Inspectors should confirm that a dutyholder:   * Has adequately considered the types of focus-group interviews (topic-based or question-based) it intends to undertake. * Has adequately considered the mix of participants (homogenous or heterogenous). * Has chosen appropriates sizes for the groups. * Has chosen to conduct enough focus group interviews (an appropriate sample size) – see also section 5.5.2. |

# Appendix E - Observations

Observations involve going into a workplace, watching what people do, and describing, analysing, and interpreting what one has seen. This could be observing day-to-day operations at a dockside, observing shift changeovers in a power-plant control room, or observing a board meeting. An observer can undertake unstructured or structured observations:

* **Unstructured observations** focus upon what people do, how people get things done (or do not get things done), the work environment, cultural artefacts, relationships, or how people talk and interact. They generate a deep understanding of context, reveal novel behaviours, and aid the identification of cultural symbols. They do however require extensive resources and time.
* **Structured observations** focus on pre-specified tasks, events, situations, or interactions. Often an observer uses an observation guide to assist the data collection. Structured observations can generate deep understanding of a specific context or issue and are useful when dutyholders have limited time and resources available. One limitation of structured observations is that greater structure infers a tighter focus, resulting in narrower descriptions overall.

Table 6 shows a comparison of unstructured and structured observations:

Table 6 - A comparison of unstructured and structured observations

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| **Unstructured observations** | **Structured observations** |
| Advantages:   * Provides a deep understanding of a wider context. * Reveals novel aspects of behaviour. * Aids the identification of cultural symbols.   Disadvantages:   * Time and resource intensive. | Advantages:   * Provides a deep understanding of a specific context or issue. * Less time and resources required. * Can provide quantitative data (number of times something occurs, or a behaviour is observed, in the context of interest).   Disadvantages:   * Narrower descriptions. * Less freedom to collect data. |

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| Inspectors should confirm that a dutyholder:   * Has adequately considered the types of observations (unstructured or structured) it intends to undertake. * Has selected the activities it intends to observe. |

# Appendix F - Quantitative data analysis

The purpose of quantitative data analysis is to help safety culture assessors examine, interpret, and draw meaningful conclusions from numerical data. Dutyholders will often use a survey to gather views of a population, normally the entire workforce, which will provide them with a large volume of numerical data that they will need to make sense of. Often, they will use commercially available software to aid them in administering the survey and analysing the data. An inspector may encounter two types of commercially available software:

* **Complete safety culture survey solutions** such as the NISCI [17] or the Health and Safety Executive’s (HSE) Safety Climate Tool [18], provide ready-made solutions comprising of a survey platforms which automate much of the data analysis, enabling dutyholders to examine, interpret and draw meaningful conclusions from the data without the need to undertake complex statistical analysis.
* **Blank-template survey solutions** such as Microsoft Forms, Google Forms, Survey Monkey, Smart Survey, or Qualtrics, are of varying sophistication and each relies on the user to build the survey by uploading the survey questions. These solutions incorporate data analysis functionality however they require a much greater degree of user intervention.

Some dutyholders may choose to adopt more advanced approaches to data analysis by using tools such as IBM’s SPSS tool. ONR considers the use of IBM’s SPSS tool to be acceptable, providing the person conducting the analysis is suitably qualified and experienced.

Safety culture assessors normally collect and analyse survey data to enable them to target subsequent qualitative data collection. For example, a safety culture assessor may analyse their survey data and find that one facility scores much higher than all other facilities on several dimensions. The safety culture assessor can then collect qualitative data (for example, several interviews) to explore why people in this facility have scored these dimensions so high. By doing this, they can identify contributory factors which other facilities can learn from.

Inspectors should confirm that dutyholders will analyse survey data by exploring how results vary across demographic groupings such as location (site/facility), function, role type, age, and tenure. Complete safety culture survey solutions, such as the NISCI software tool, enable users to do this with minimal effort. The NISCI software tool will, in time, also provide users with their results relative to the industry mean so that they can benchmark their performance with other dutyholders and, importantly, learn from best practices. ONR considers the NISCI’s in-built data analysis functionality to be good practice and therefore dutyholders who choose to use the NISCI will be well-placed to demonstrate that their quantitative data analysis meets the expected standard.

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| Inspectors should confirm that a dutyholder:   * Has adequately considered how it will analyse the survey data, which should include exploring how results vary across demographic groupings. * Has adequately considered how it will use the results of the quantitative data analysis to target subsequent data collection. |

# Appendix G - Qualitative data analysis

The purpose of qualitative data analysis is to help safety culture assessors make sense of large volumes of content by applying some form of methodological rigour. One of the most common methods that safety culture assessors use to achieve this is thematic analysis.

A safety culture assessor can use thematic analysis to identify themes that occur repeatedly across a dataset which are of importance to the safety culture assessment’s aims. By means of example, several passages of text from interview transcripts may refer to leaders communicating the importance they place on safety, to which the safety culture assessor assigns a code: “Leader Safety Communications.” Other passages of text may relate to workers experiences of seeing their leaders out on plant, which they code as: “Leader Visibility.” They may then group these together along with other related codes into the overarching theme of: “Leader Safety Commitment.” Grouping text in this way and subsequently analysing it, can lead to rich insights about aspects of organisational life which are important to safety culture. In this example, the analysis may describe how leaders enact their commitment to safety, how workers perceive this, and how it influences worker behaviour.

ONR has found that a form of thematic analysis known as ‘template analysis’ is well suited to safety culture assessments that use a model of safety culture. In template analysis the themes are pre-determined, and, in the context of a safety culture assessment, they would be based upon the dimensions and sub-dimensions of a safety culture model. The safety culture assessor would create an initial template structured upon these pre-determined themes which they will use later in their analysis to group the data to.

After developing an initial template and completing the data collection, the safety culture assessor’s next step is normally to immerse themselves in the data set to get a sense of the whole. They would do this by reading and re-reading the interview transcripts, notes from focus group interviews, observation field notes, and documents selected for document analysis, and in doing so they will begin to make connections between discrete data sources and develop ideas about the nature of the areas they are exploring. Following this, they would then assign codes to the data which they would then relate to one of the pre-determined themes in the initial template.

In a well-designed safety culture assessment, the safety culture assessor would code and group much of the data under the pre-determined themes however it is not unusual for them to develop a small number of additional themes that are relevant to the safety culture assessment’s aims, but which may not fit to the initial template. They would then add these additional themes to the template, thereby expanding it, before continuing with the coding and grouping of the data. By expanding the template in this way, the safety culture assessor can assure themselves that they do not omit any data which may be important to the safety culture assessment.

Once the safety culture assessor has coded and grouped all relevant data to the template, they would subsequently analyse the grouped data, theme by theme, to explore its meaning. As they develop their analysis it may become clear to them that there are additional themes which seem to cut across several or all the other themes. These are known as ‘integrative themes’ and often provide deep insights into the non-observable culture – the underlying assumptions – which can be an important finding of the safety culture assessment.

Template analysis is a simple and efficient method for grouping and analysing qualitative data. Inspectors can find further guidance on template analysis in ONR guide, “Methods for Assessing Culture and Diagnosing Organisational Problems” [19]. Other methods which are well-suited to safety culture assessment, and which inspectors may encounter include:

* **Content analysis** – a method for evaluating patterns within a piece (or multiple pieces) of content such as documents or interview transcripts. A safety culture assessor can use content analysis to determine the frequency that something of interest appears in a document or the frequency that people speak about something. They can also use it to identify patterns of deeper underlying interpretations, for example, by identifying phrases in documents that highlight what an organisation’s leadership truly values. Content analysis has both a quantitative and qualitative element to it.
* **Narrative analysis** – a method for understanding the meaning of stories that people tell. A safety culture assessor can use narrative analysis to gain insights into how people view a situation by analysing what they say and the way that they say it. For example, a line manager discussing a time that they held a member of their team to account for poor safety behaviour may provide insights into the line manager’s views on the value they place on their people and their perceptions of justice.
* **Discourse analysis** – a method for analysing language in its social context.   
  A safety culture assessor can use discourse analysis to gain insights into how people speak to each other and what they can infer about the safety culture from this. For example, a member of the executive team may speak in a relaxed and friendly manner to a worker in an organisation that values equality amongst workers more so than hierarchical rank or grade. Similarly, a senior manager may speak more openly to a regulator about recent safety failings if the organisation values openness and transparency, more so than protecting its reputation.

Dutyholders may choose to use one, or a combination of, the analysis methods outlined above, or they may choose to use other recognised qualitative data analysis methods not covered here. However, ONR considers the four steps of: (1) data immersion; (2) the coding of data; (3) the grouping of coded data to themes; (4) and the analysis of the grouped data theme-by-theme, to be key elements of qualitative data analysis in the context of safety culture assessment. If an inspector finds that a dutyholder has omitted one or more of these steps, then this may indicate that the dutyholder’s approach to the analysis of the qualitative data is not adequate.

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| Inspectors should confirm that a dutyholder’s analysis of the qualitative data includes the four steps of:   * Data immersion. * The coding of data. * The grouping of coded data to themes. * The analysis of the grouped data theme-by-theme. |

# Appendix H - Inspector aide-mémoire

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| **Overarching judgement (section 5.1)**  In the inspectors’ opinion has the dutyholder adopted an approach to safety culture assessment and improvement that is broadly consistent with RGP? |
| **Nuclear safety focus (section 5.1)**  Inspectors should confirm that a dutyholder’s safety culture assessment adequately considers culture as it relates to nuclear safety. |
| **Define safety culture (section 5.3)**  Inspectors should confirm that a dutyholder’s understanding of safety culture encompasses each of the following four interrelated elements: (1) the underlying assumptions; (2) the value placed upon safety; (3) structures and management system; (4) behavioural norms. |
| **Choose a model of safety culture (section 5.4)**  Inspectors should confirm that:   * A dutyholder has taken appropriate steps to ensure that its choice of model accurately captures the target construct of safety culture. * The model includes leadership dimensions or attributes. |
| **Design the safety culture assessment (section 5.5)**  Inspectors should confirm that a dutyholder:   * Designs and executes its safety culture assessment in such as way that it adequately addresses all four inter-related elements outlined in ONR’s definition of culture. These are: (1) the underlying assumptions; (2) the value placed upon safety; (3) structures and management system; (4) behavioural norms. * Uses both quantitative and qualitative methods. * Sequences and combines methods in a logical way which supports the assessment’s aims. * Has set an adequate survey completion rate target for the quantitative phase. * Has selected adequate sample sizes for the qualitative phase. * Has not relied solely on volunteers. * Has adopted a purposeful sampling strategy. * Has documented the measures it will take to achieve saturation. |
| **Write a safety culture assessment plan (section 5.6)**  Inspectors should confirm that a dutyholder’s assessment plan adequately addresses the typical content listed in section 5.6. |
| **Collect the data – surveys (section 5.7 and Appendix A)**  Inspectors should confirm that a dutyholder’s choice of survey has undergone adequate scale development and scale evaluation. |
| **Collect the data – document analysis (section 5.7 and Appendix** B**)**  Inspectors should confirm that a dutyholder:   * Has selected appropriate documents to analyse. * Has adequately considered how it will combine the output of document analysis with the other data collection methods. |
| **Collect the data – interviews (section 5.7 and Appendix C)**  Inspectors should confirm that a dutyholder:   * Has adequately considered the types of interviews (unstructured or semi-structured) it intends to undertake. * Has identified who it intends to interview (adopts a purposeful sampling strategy; does not rely solely on volunteers) – see also section 5.5.2. * Has chosen to conduct enough interviews (an appropriate sample size) – see also section 5.5.2. |
| **Collect the data – focus group interviews (section 5.7 and Appendix D)**  Inspectors should confirm that a dutyholder:   * Has adequately considered the types of focus-group interviews (topic-based or question-based) it intends to undertake. * Has adequately considered the mix of participants (homogenous or heterogenous). * Has chosen appropriates sizes for the groups. * Has chosen to conduct enough focus group interviews (an appropriate sample size) - see also section 5.5.2. |
| **Collect the data – observations (section 5.7 and Appendix E)**  Inspectors should confirm that a dutyholder:   * Has adequately considered the types of observations (unstructured or structured) it intends to undertake. * Has selected the activities it intends to observe. |
| **Analyse the data – quantitative data analysis (5.8.1 and Appendix F)**  Inspectors should confirm that a dutyholder:   * Has adequately considered how it will analyse the survey data, which should include exploring how results vary across demographic groupings. * Has adequately considered how it will use the results of the quantitative data analysis to target subsequent data collection. |
| **Analyse the data – qualitative data analysis (section 5.8.2 and Appendix G)**  Inspectors should confirm that a dutyholder’s analysis of the qualitative data includes the four steps of:   * Data immersion. * The coding of data. * The grouping of coded data to themes. * The analysis of the grouped data theme-by-theme. |
| **Communicate the findings (section 5.9)**  Inspectors should confirm that a dutyholder’s communication of the findings to the workforce:   * Is senior management led. * Encourages interaction and reflection. * Encompasses workers at all levels of the organisation. |
| **Act upon the results (section 5.10)**  Inspectors should confirm that a dutyholder:   * Creates actions that address systemic factors rather than the symptoms of problems. * Has educated its senior management team in a systemic approach to safety, which emphasises the interaction between humans, technology, and the organisation. * Uses multidisciplinary cross-functional teams which include safety culture experts knowledgeable in behavioural sciences/organisational psychology to assist in understanding complex cultural factors and the implications of these on safety. * Has a senior management team that is actively committed to improving the safety culture. * Co-develops actions with workers at all levels. * Has developed a mutual understanding of safety and of safety culture amongst all its workforce. * Has ensured that all its workers understand the radiation risks and hazards that they face, the control measures in place, and why these control measures are important for their safety. * Has ensured that all its workers understand how their work may impact upon others and recognise and accept that they are personally responsible for their safe conduct within the workplace and their role in improving the safety culture. * Has put in place management champions and worker advocates for safety culture improvements. * Has established reward systems that support long-term safety improvements. * Adequately manages the safety culture improvement plan, adopting programme management or project management techniques for complex or wide-ranging improvement plans. |
| **Review, learn and improve (section 5.11)**  Inspectors should confirm that a dutyholder:   * Has conducted, or plans to conduct, an RLI. * Has implemented the key lessons of the last assessment into the design and execution of the current assessment. |
| **Independent assessment (section 5.12)**  Inspectors should confirm that a dutyholder:   * Has selected a body to conduct the independent assessment which has an appropriate degree of cultural independence. * Has specified the independent assessment to ensure that the body conducting it uses approaches consistent with RGP, such as the methods outlined herein. * Has supervised the independent assessment. * Has reviewed its output. * Has not unduly influenced the independence of the assessment. |
| **Capability – competence and capacity (section 5.13)**  Inspectors should confirm that a dutyholder:   * Has made use of suitably qualified and experienced safety culture experts. * Has ensured that only suitably qualified and experienced persons will conduct safety culture assessment. * Has adequate financial and human resources for both conducting the assessments and addressing the findings arising from them. * Includes safety culture assessor posts and/or roles on its nuclear baseline. |
| **Frequency of assessment (section 5.14)**  Inspectors should confirm that a dutyholder has included within its management system, arrangements which initiate safety culture assessments at the following frequency:   * A comprehensive self-assessment at least once every five years. * A comprehensive independent assessment at least once every ten years. * Continual assessment once per year.   Inspectors should also confirm that a dutyholder is conducting safety culture assessments at the frequencies set out in its management system. |