

# Multinational Design Evaluation Programme (MDEP)

## Technical Report

### TR-VICWG-07

Related to: Vendor Inspection Cooperation Working Group

## Technical Report on Safety Culture in the Nuclear Supply Chain

#### Participation

Regulators involved in the MDEP working group discussions:	ASN, CNSC, KINS, ONR, NNSA, NNR, NRA, NRC, Rostechнадзор, STUK.
Regulators which support the Technical Report:	ASN, CNSC, KINS, ONR, NNSA, NNR, NRA, NRC, Rostechнадзор, STUK.
Regulators with no objection:	N/A
Regulators which disagree:	N/A
Compatible with existing IAEA related documents:	Yes

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## **Vendor Inspection Cooperation Working Group Technical Report on Safety Culture in the Nuclear Supply Chain**

### **1.0 Introduction**

In 1991, as a result of the 1986 Chernobyl nuclear power plant accident, the International Nuclear Safety Group (INSAG) emphasized the concept of safety culture to the nuclear industry in its report, INSAG-4, "Safety Culture." INSAG is an advisory group to the International Atomic Energy Agency (IAEA). INSAG-4's definition of safety culture is "that assembly of characteristics and attitudes in organizations and individuals which establishes that, as an overriding priority, nuclear plant safety issues receive the attention warranted by their significance."

The accident at the Chernobyl nuclear power plant brought attention to the importance of safety culture and the impact that weaknesses in safety culture can have on safety performance. Since then, the importance of a positive safety culture has been demonstrated by several significant, high-visibility events worldwide. For example, the 2002 discovery of degradation at the Davis-Besse nuclear power plant reactor vessel head highlighted problems that develop when the safety environment at a plant receives insufficient attention. Most recently, the 2011 nuclear accident at the Fukushima Daiichi nuclear power plant illustrates the importance of thoroughly assessing possible nuclear safety impacts of a hypothetical, yet credible, extreme external event.

Throughout the years, nuclear safety culture has been given different definitions. For example, IAEA and the United Kingdom's Office for Nuclear Regulation define safety culture as "the assembly of characteristics and attitudes in organizations and individuals which establishes that, as an overriding priority, protection and safety issues receive the attention warranted by their significance." The United States' Institute of Nuclear Power Operations and the Nuclear Regulatory Commission define safety culture as "the core values and behaviors resulting from a collective commitment by leaders and individuals to emphasize safety over competing goals to ensure protection of people and environment." Consequently, nuclear safety culture is a collective responsibility. Important attributes of any safety culture are the employees' willingness to raise safety concerns without fear of retaliation, i.e., a Safety Conscious Work Environment (SCWE), as well as a strong Problem Identification and Resolution program (PI&R). SCWE is defined as a work environment in which employees are encouraged to raise concerns and where such concerns are promptly reviewed, given the proper priority based on their potential safety significance, and appropriately resolved with timely feedback to employees. A strong PI&R program ensures that issues potentially impacting safety are promptly identified, fully evaluated and promptly addressed and corrected, commensurate with their significance. Identification and resolution of a broad spectrum of problems, including organizational issues, are used to strengthen nuclear safety and improve performance.

### **2.0 Background/Purpose**

Worldwide, safety culture is evaluated at multiple levels. The Nuclear Energy Agency's Committee on Nuclear Regulatory Activities, Working Group on Safety Culture (WGSC) was established for member countries to collaboratively address complex issues regarding safety culture to improve regulatory effectiveness and to ensure that licensees meet the ultimate responsibility for ensuring safety. The individual countries' regulators have the responsibility to evaluate the safety culture of its licensees. The Multinational Design Evaluation Programme (MDEP) Vendor Inspection Cooperation Working Group (VICWG) developed a survey on safety culture to understand how each member country implements safety culture in the nuclear supply chain. The survey consisted of 14 questions covering areas such as regulations, existing guidance, safety culture assessments, training on safety culture, public outreach, documentation, and continued monitoring.

The purpose of this Technical Report (TR) is to provide a high-level summary of how each member country encourages or regulates safety culture in the nuclear supply chain based on the responses to the survey. This TR also identifies commonalities and differences between regulatory practices of the member countries in encouraging or regulating safety culture in the nuclear supply chain. The results of the survey showed that in terms of overseeing safety culture in the nuclear supply chain, there are more commonalities than differences between the member countries.

### **3.0 Survey Results**

The survey results provided by 9 countries are summarized in six different overarching areas: (1) Regulatory Framework; (2) Guidance; (3) Assessments, Audits, and/or Inspections; (4) Training; (5) Public Outreach; and (6) Documentation and Continued Monitoring. Each area's summary starts with the question from the survey that covers that specific subject. In addition, Table 1 "Comparative Summary Table on Nuclear Supply Chain Safety Culture Oversight," provides a quick snapshot of how each member country oversees safety culture in the nuclear supply chain based on some of the topics addressed in the survey.

#### **Regulatory Framework**

##### **Does the regulatory authority have any existing regulations or policies on safety culture of the licensee and their sub-suppliers (i.e. vendors)?**

Most countries have policies in place to implement safety culture in the nuclear supply chain. Only three countries have regulations in place for safety culture while one country doesn't have either a regulation or a policy. Whether it's a regulation or a policy, each country's approach to safety culture appears to be consistent with its importance.

The survey results showed that all the countries agree that licensees are ultimately responsible for the safety culture of the nuclear supply chain. As such, most countries rely on the licensees' assessments of their suppliers' nuclear safety culture to ensure that there are not any existing safety culture issues in the nuclear supply chain.

#### **Guidance**

##### **Is Regulatory Guidance on safety culture for the licensees available to the public, and does it apply to the supply chain?**

Most countries provide regulatory guidance on safety culture for the licensees that is available to the public. Only two countries do not provide regulatory guidance on safety culture. Of the seven countries that do offer regulatory guidance on safety culture, for only four countries the guidance is applicable to the nuclear supply chain. The applicability of the regulatory guidance on safety culture to the nuclear supply chain seems to be directly dependent on the regulatory framework of the country. In addition, the survey results showed that all countries agreed that the development of international guidance for improving safety culture in the nuclear supply chain would be beneficial.

When speaking about guidance, policy, and regulation, for purposes of this TR, guidance and policy are not enforceable, but regulation is. For countries whose regulatory framework includes direct oversight of the nuclear supply chain, the regulatory guidance on safety culture is applicable to the suppliers. In addition, when the regulatory framework on safety culture is based on regulations, safety culture is not directly applicable to the nuclear supply chain, but applicable through the licensees. However, when implemented through policies, for all countries except for two countries, safety culture is directly applicable to the nuclear supply chain. These two countries do not apply their safety culture regulations to the supply chain.

### **Assessment, Audits, and/or Inspections**

#### **Does the regulatory authority conduct specific assessments, audits, and/or inspections related to safety culture? How does the regulatory authority's framework incorporate assessments of SC in the supply chain?**

Most countries provide some level of oversight of the safety culture in the nuclear supply chain either through direct observation or evaluation of the licensees' assessments, or independently. This oversight is performed using procedures that guide the regulators in their oversight of the licensees' and/or suppliers. As to whether the countries' regulatory framework directly incorporate assessments of safety culture in the nuclear supply chain, the survey results showed this not to be the case as most countries consider that licensees are responsible for performing assessments of safety culture in the nuclear supply chain.

The visible aspects of an organization's safety culture can be assessed by evaluating the extent to which its policies, programs, and processes ensure that nuclear safety issues receive the attention warranted by their significance. The effectiveness of a licensee and/or nuclear supplier's corrective action program at identifying, prioritizing, and resolving issues with nuclear safety impacts provides important insights into the licensee and/or nuclear supplier's safety culture.

### **Training for Inspectors**

#### **Does the regulatory authority have safety culture training for inspectors, including vendor inspectors?**

Only four countries offer specific training in safety culture to the nuclear supply chain inspectors. The other countries offer generic safety culture training to their licensees' inspectors. For most of the countries that do offer safety culture training to their nuclear supply chain inspectors, the training seems to be generic in nature and does not appear to include any detailed guidance on how to inspect safety culture in the nuclear supply chain.

Training is an essential part of any program to ensure its effective implementation. In the case of safety culture, providing safety culture training to the nuclear supply chain inspectors allows them to become proficient in the techniques and skills needed to collect, analyze, and integrate the information collected during an inspection to develop a sound conclusion regarding a supplier's strengths and weaknesses in its safety culture.

### **Documentation and Continued Monitoring**

#### **Does the regulatory authority include safety culture findings in vendor inspection reports? How does the regulatory authority monitor the progress on safety culture findings in the supply chain?**

Most countries rely on results of the licensees' assessments of their suppliers' safety culture to gain information on safety culture rather than formally documenting safety culture findings in inspection reports. The documentation of safety culture findings is directly related to scope of each countries' regulatory framework and whether it encompasses the regulator's direct oversight of safety culture in the nuclear supply chain. The survey results showed that findings on safety culture are not typically documented in supplier inspection reports.

With regards to the monitoring of safety culture findings identified in the nuclear supply chain, most countries rely on the licensees to ensure that safety culture findings are adequately resolved. Because most countries do not have direct oversight of safety culture in the nuclear supply chain, any monitoring is done by the regulators during inspections of their licensees through a review of the licensee's corrective action programs.

Since most countries do not perform safety culture assessments of the nuclear supply chain, there hasn't been a significant number of key themes identified. For those countries that do perform safety culture assessments, the survey results revealed problems with how leaders deal with safety culture.

This is an important observation since the quality and actions of an organization's leadership have widespread consequences for its safety culture and performance. Leaders have significant power to affect an organization's safety culture through the priorities they establish, the behaviors and values they model, the reward systems they administer, the trust they create, and the context and expectations they establish for interpersonal relationships, communication, and accountability. Leaders have the power and responsibility to set strategy and direction, align people and resources, motivate and inspire people, and ensure that problems are identified and solved in a timely manner. A lack of commitment or clear communication about what is important to the organization can create a conflict for employees who must then decide between competing messages. This leads employees to their own interpretations, thereby potentially negatively affecting the organization's safety culture. It is also important to note that leaders at all levels play an important role in establishing the organization's environment and safety culture.

### **Outreach**

**Does the regulatory authority have any regulatory practices that influence licensees' safety culture?**

**How does the regulatory authority influence or encourage licensees to extend positive safety culture attributes to their suppliers and vendors?**

Most countries perform some type of outreach with their licensees and suppliers to improve and influence the safety culture of their licensees and the nuclear supply chain. This outreach can consist of training, public meetings, conferences, workshops, seminars, etc. There are also educational tools developed by the regulators that are made available to the licensees and the nuclear supply chain. For example, one country has a brochure that contains its Safety Culture Policy Statement. This brochure is given directly to the suppliers and their staff when performing inspections at the supplier's facility. Another example of educational tools are presentations given at external meetings and conferences, both domestic and internationally, by four countries. Another method of communicating the importance of safety culture relies on the regulators reinforcing their safety culture expectations for licensees and the nuclear supply chain, which is determined by each country's regulatory framework.

## **4.0 Conclusions and Recommendations**

This TR presents a high level summary of the existing regulatory practices of the MDEP VICWG countries related to safety culture in the nuclear supply chain, including various commonalities and differences. As part of efforts to promote common understanding among countries, the information presented in this report could be used as a starting point for member countries to learn safety culture best practices from each other. All countries agree that licensees bear the primary responsibility for safety culture. In addition, all member countries agreed that the development of international guidance for improving safety culture in the nuclear supply chain would be beneficial.

Countries could also learn from each other by observing each other's assessments, audits, and/or inspections related to safety culture, whether the activity is performed at the licensee or at a supplier. These observations could help identify new best practices not implemented yet by a country and provide consistency when dealing with issues associated with safety culture in the nuclear supply chain.

**Table 1. Comparative Summary Table on Nuclear Supply Chain Safety Culture Oversight**

	Canada	China	Finland	France	Japan	Korea	South Africa	United Kingdom	United States
<b>SC Regulation or Policy</b>	Regulation	Policy	Regulation	None	Regulation	Policy	Policy	Policy	Policy
<b>SC Regulatory Guidance Available</b>	Yes, N/A to Supply Chain	Yes, Applicable to Supply Chain	Yes, Applicable to Supply Chain	No, N/A to Supply Chain	Yes, N/A to Supply Chain	No, N/A to Supply Chain	Yes, Applicable to Supply Chain	Yes, N/A to Supply Chain	Yes, Applicable to Supply Chain
<b>SC Assessment, Audits or Inspections</b>	Yes, Observing	Yes, Independently	Yes, 3 <sup>rd</sup> Party	No	Yes, Independently	Yes, Observing	Yes, Observing	Yes, Observing	Yes, Independently
<b>SC Training Available</b>	No	Yes	Yes	No	Yes	No	No	No	Yes
<b>SC Findings in Inspection Reports</b>	No	Yes	Yes	Yes	Yes	No	Yes	Yes	No
<b>Monitor SC Inspection Findings</b>	Yes	Yes	Yes	No	No	Yes	No	Yes	Yes
<b>Action Taken to Improve SC</b>	Yes	Yes	Yes	No	Yes	Yes	Yes	Yes	Yes
<b>SC Outreach</b>	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes