

# The Nuclear Delta®

## A Requirement for Professional Membership of the Nuclear Institute

The Nuclear Delta® sets the benchmark for the nuclear specific standards of understanding and behaviours that nuclear professionals must demonstrate to operate within the sector and to qualify for professional membership and fellowship of the Nuclear Institute (MNUCl, FNUCl) as the Professional Body and Learned Society for the Nuclear Industry.

The Nuclear Delta has three core elements:

1. **Nuclear Safety Culture**
2. **Nuclear Security Culture**
3. **Nuclear Technology**

The requirements are set out below and are aligned to IAEA standards.

- Your application for Member or Fellow of the Nuclear Institute needs to evidence some of the following for each section. It should cover all 3 sections.
- Not all of the examples will apply to everyone, but please include as many as are relevant to positions you have held
- We need to hear about **your** work specifically. Your application must (this is essential!) describe examples of how you personally have applied the principles and demonstrated the required behaviours in your day-to-day role.
- Applications should therefore demonstrate multiple examples of how real-world competence has been applied. A theoretical application that doesn't delve into the details of your work and talks only about general or high level principles with minimal detail or examples is very unlikely to pass.
- FELLOW ONLY: Applicants for Fellow must be operating in senior roles with high levels of autonomy and must also demonstrate a "significant personal contribution" to the Nuclear industry, over and above their usual job.  
This could be things like (but not limited to):
  - Publishing papers
  - Speaking at conferences
  - Political campaigning
  - Educating the public
  - Contributions to primary, secondary or tertiary education and beyond
  - Significant mentorship
  - Leading research that has moved the industry forward

### **Nuclear Safety Culture**

To comply with the Nuclear Delta requirements, members shall demonstrate;

- A clear understanding of 'Nuclear Safety Culture'.

- A commitment to 'personal behavioural standards' within the Nuclear Industry.

The standard below is aligned to the International Nuclear Safety Advisory Group definition of Nuclear Safety Culture, defined as: *That assembly of characteristics and attitudes in organisations and individuals that, as an overriding priority, nuclear plant safety issues receive the attention warranted by their significance.* (INSAG 15)

#### Required understanding

As a Professional Member of the Nuclear Institute you are required to demonstrate knowledge and understanding of the following:

- What is meant by Nuclear Safety Culture.
- Your role, responsibilities, boundaries of your authority and reporting lines in respect of nuclear safety.
- The roles and responsibilities for safety of others within your organisation and/or site including, where applicable, the roles and responsibilities of Site Licensees/Authorisees and Contractors.
- How human error has contributed to previous nuclear industry accidents and to recognise how avoidance of human error contributes to future safe operation.
- The principles of nuclear safety, how these apply to your work and their importance as a foundation for sound decisions and actions.
- The contribution you, your activities and/or the products of your work play in maintaining nuclear safety.
- How to apply human performance and error-reduction tools within your role
- The safety track record of the nuclear industry, including awareness of key incidents, identified causes, contributory factors and resulting 'lessons learned'.
- The importance of employee vigilance and reporting to maintaining an effective nuclear safety culture.
- How to present a high level of personal professional responsibility for nuclear safety.

#### Required behaviours

**As a Professional Member of the Nuclear Institute you are required to demonstrate following behaviours and standards. Please tell us, with reference to practical examples, how you have\*:**

- Challenged unsafe acts and behaviour and reinforce safe practice appropriately and effectively.
- Applied the principles of nuclear safety to check that your decisions and work activities support safe nuclear operations.
- Applied human performance and error-reduction tools within your role.
- Worked against complacency, maintaining and encouraging a questioning attitude.
- Contributed to continuous improvement, maintaining an 'it can happen here' attitude.
- Used organisation and/or site reporting systems effectively to learn from experience.

*\*Please include as many as apply to your role*

#### Required behaviours (leadership roles)

Professional Members of the Nuclear Institute in leadership roles are also expected to promote behaviours to encourage effective safety behaviours:

- Practise visible leadership by observing, coaching, mentoring, and reinforcing standards and commitment to policies and procedures.

- Consider the employee's perspective in understanding and analysing issues.
- Provide appropriate oversight during safety-significant work.
- Involvement in high-quality nuclear safety training that consistently reinforces expected behaviours.
- Provide clear and consistent messages to all staff that acknowledge the importance of nuclear safety.

## Nuclear Security Culture

To comply with the Nuclear Delta requirements, members shall demonstrate;

- A clear understanding of 'Nuclear Security Culture'.
- A commitment to 'personal behavioural standards' within the Nuclear Industry.

The standard below is aligned to the IAEA Nuclear Security definition of Nuclear Security Culture, defined as: *The assembly of characteristics, attitudes and behaviour of individuals, organisations and institutions which serve as a means to support and enhance nuclear security.* (IAEA Nuclear Security Series No 7 & ONR TAG CNS-TAST-GD-002 (Rev 0))

### Required understanding

As a Professional Member of the Nuclear Institute you are required to demonstrate knowledge and understanding of the following topics at a level appropriate to your responsibilities and grade:

- What is meant by Nuclear Security Culture.
- Your role, responsibilities, boundaries of your authority and reporting lines in respect of nuclear security.
- What is meant by Safeguards, covering accountancy, inspections and additional protocols.
- The contribution you, your activities and/or the products of your work play in maintaining nuclear security.
- The importance of employee vigilance and reporting to maintaining an effective nuclear security culture.
- The nature of potential security threats and the reasons why controls are required.
- Work place access and restrictions, including:
  - Personal access to site and restricted areas, including use and protection of security passes.
  - Restrictions on items brought onto, removed from or used on site.
  - General security principles and practices (need to know, steps to avoid accidental security breaches, complacency, vigilance, commitment to following specific policies, procedures and good practices).
- Management of sensitive information, including:
  - Local policy, requirements and procedures, including document classification system.
  - Correct handling and storage of information, as it applies to your job role.
  - Correct IT security practices (locking PCs, password strength and protection, use of laptops, especially off-site).
- Risks of transmission of sensitive safety and security information and precautions when using electronic communications (telephones, mobiles, email, fax and social media).
- Response procedures, alarms and appropriate responses to nuclear security incidents and events.
- How to present a high level of personal professional responsibility for nuclear security.

*\*Please include as many as apply to your role*

### Required behaviours

**As a Professional Member of the Nuclear Institute you are required to demonstrate following behaviours and standards. Please tell us, with reference to practical examples, how you have\*:**

- Discharged your role responsibilities for nuclear security, within the limits of your authority.
- Accepted accountability for maintaining nuclear security within your area of responsibility, contributing to identifying and resolving any shortfall in complying with requirements.
- Identified and understood the potential consequences arising from planned activities and their implications for nuclear security.
- Taken appropriate action to prevent or minimise the risk of a security incident or other unintended consequence of your work (or work product).
- Recognised what is security critical for their role.
- Challenged acts which could undermine security and reinforce security practice appropriately and effectively.
- Complied with nuclear security and environmental regulatory requirements to protect people, property and the environment from threats (malicious acts)
- Complied with regulatory and legal Safeguard requirements to ensure appropriate controls are in place to manage nuclear materials and sensitive nuclear information

## Nuclear Technology

To comply with the Nuclear Delta requirements, members shall demonstrate;

- A clear understanding of 'Nuclear Technology.'
- A commitment to 'personal behavioural standards' within the Nuclear Industry.

The standard below is aligned to the IAEA definition of Nuclear Safety, defined as: *The achievement of proper operating conditions, prevention of accidents or mitigation of accident consequences, resulting in protection of workers, the public and the environment from undue radiation hazards.* (IAEA Safety Glossary).

### Required understanding

As a Professional Member of the Nuclear Institute you are required to demonstrate knowledge and understanding of the following topics at a level appropriate to your responsibilities and grade:

- What is meant by Nuclear Technology.
- The regulatory regime within which the nuclear industry operates, as applicable to the organisation, sub-sector and national context in which you work.
- Local policy, procedures and work processes that support Nuclear Safety within the context of your work.
- The range of public opinion regarding nuclear sector operations.
- The principles of nuclear science and engineering
  - Structure of the atom e.g. characteristics of electrons, neutrons and protons, mass number, atomic number and isotopes.
  - Nature and effect of radiation, e.g. sources, applications of radioisotopes
  - Types of radiation, including, radioactive decay, half-life, ionising radiation, interaction with matter.
- A knowledge and understanding of nuclear science and engineering at a level, breadth and depth applicable to your role and working environment, drawn from the following areas:

- The fundamentals of heat removal and containment relating to nuclear safety, including the need for reactor post shutdown cooling and decay heat removal.
  - Methods of reducing exposure to radiation - reducing exposure, equivalent dose, time, distance and shielding including variations in requirements for differing types of radiation.
  - Control of contamination – definition of contamination, control methods, contamination monitoring.
  - Science and engineering of the nuclear fuel cycle including:
    - Criticality.
    - Nuclear Reactor Systems.
    - Reactor Safety and Hazards.
    - Nuclear Weapons.
    - Reprocessing.
    - Waste Management.
  - Defence-in-Depth, including redundancy, diversity and segregation.
  - Additional measures required to support nuclear safety during the post operational clean-out and decommissioning phase at nuclear facilities.
- Emergency procedures, potential emergency situations, alarms and appropriate responses.
- Awareness of legal requirements for handling radioactive materials and how these apply to your work role and activities.

**Required behaviours**

As a Professional Member of the Nuclear Institute you are required to demonstrate commitment to the following behaviours and standards:

- Discharge your role responsibilities for safety, within the limits of your authority.
- Accept accountability for maintaining safety standards within your area of responsibility, contributing to identifying and resolving any shortfall in meeting standards.
- Take appropriate action when faced with unexpected or uncertain conditions to prevent or minimise the risk of a safety incident, unsafe action or other unintended consequence of your work (or work product).
- Recognise what is safety critical.
- Understand and comply with nuclear and environmental regulatory requirements to protect people, property and the environment from hazards (accidents, malfunctions and natural events).
- Apply operating procedures and safe systems of work to meet organisational and regulatory requirements and minimise risk of exposure to radiation.
- Attend emergency scheme training and demonstration exercises as required.
- Organise work activity to minimise potential for contamination, as applicable to the role.
- Accurately and factually represent the pros and cons of nuclear technology, when called upon to do so.