WANO

W A N O

PRINCIPLES

WANO PRINCIPLES

PL | 2013-1

May 2013

Traits of a Healthy Nuclear Safety Culture

APPLICABILITY

THIS WANO PRINCIPLES REPORT APPLIES TO ALL REACTOR TYPES

OPEN DISTRIBUTION

PRINCIPLES | PL 2013-1
Traits of a Healthy Nuclear Safety Culture

CONTENTS

PRINCIPLES | PL 2013-1
Traits of a Healthy Nuclear Safety Culture

Summary

Traits of a Healthy Nuclear Safety Culture builds on the knowledge and experience developed since the publication of *Principles of a Strong Nuclear Safety Culture*, in 2006. *Traits of a Healthy Nuclear Safety Culture* describes the essential traits and attributes of a healthy nuclear safety culture, with the goal of creating a framework for open discussion and continuing evolution of safety culture throughout the commercial nuclear energy industry. For the purposes of this document, a trait is defined as a pattern of thinking, feeling and behaving such that safety is emphasised over competing priorities. Experience has shown that the personal and organisational traits described in this document are present in a positive safety culture. Conversely, shortfalls in these traits and attributes are a significant contributor to plant events.

Rather than prescribing a specific programme or implementation method, this document describes the basic traits. These traits and attributes, when embraced, will be reflected in the values, assumptions, behaviours, beliefs and norms of an organisation and its members. Ideally, the traits will describe what it is like to work at a nuclear facility and how things are done there. Traits appear in boldface. The attributes clarify the intent of the traits. Utility managers are encouraged to make in-depth comparisons between these traits and their day-to-day policies and practices, and to use any differences as a basis for improvements.

> Utility managers are encouraged to make in-depth comparisons between these traits and their day-to-day policies and practices, and to use any differences as a basis for improvements.

Background

Nuclear safety culture is defined as the core values and behaviours resulting from a collective commitment by leaders and individuals to emphasise safety over competing goals, to ensure protection of people and the environment.

This updated definition was developed to apply broadly across all industries that use nuclear technologies. For the commercial nuclear power industry, nuclear safety remains the overriding priority. Although the same traits apply to radiological safety, industrial safety, security and environmental safety; nuclear safety is the first value adopted at a nuclear station and is never abandoned.

Over the years, watershed events have influenced the safety culture at commercial nuclear power plants. The industry had its first such event in 1979, as a result of the accident at Three Mile Island nuclear power plant. Many fundamental problems involving hardware, procedures, training and attitudes toward safety and regulation contributed to the event.

In 1986, the Chernobyl accident was a stark reminder of the hazards of nuclear technology. This accident resulted from many of the same weaknesses that led to the Three Mile Island accident. In addition, it highlighted the importance of properly maintaining design configuration, plant status control, line authority for reactor safety and cultural attributes related to safety.

Response from industry and regulatory organisations to both these events was sweeping. Improvements were made in standards, hardware, emergency procedures, processes, training (including simulators), emergency preparedness, design and configuration control, testing, human performance and attitudes toward safety.

The 2002 discovery of degradation of 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 power plant illustrates the importance of thoroughly assessing possible nuclear safety impacts of a hypothetical, yet credible, extreme external event. It also illustrates the importance of emergency response command and control, training and resource availability for such an event.

A theme common in these events is that problems crept in over time, often related to or a direct result of the plant culture. Had these problems been recognised, challenged and resolved, the events could have been prevented or their severity mitigated. The series of decisions and actions that resulted in these events can usually be traced to the shared assumptions, values and beliefs of the organisation.

These events and the notion that culture is a key ingredient in the overall success of the plant, form the basis for this document.

Organisational culture is the shared basic assumptions that are developed in an organisation as it learns and copes with problems. The basic assumptions that have worked well enough to be considered valid are taught to new members of the organisation as the correct way to perceive, think, act and feel. Culture is the sum total of a group's learning. Culture is for the group what character and personality are for the individual.

In addition to a healthy organisational culture, the special characteristics and unique hazards associated with nuclear technology – radioactive by-products, concentration of energy in the reactor core and decay heat – mean each station needs a healthy safety culture.

Nuclear safety is a collective responsibility. The concept of nuclear safety culture applies to every employee in the nuclear organisation, from the board of directors to the individual contributor. No one in the organisation is exempt from the obligation to ensure nuclear safety is the highest priority.

The performance of individuals and organisations can be monitored and trended; therefore, performance may serve as an indicator of the health of an organisation's safety culture. However, the health of an organisation's safety culture could lie anywhere along a broad continuum, depending on the degree to which the attributes of safety culture are embraced. Even though safety culture is somewhat of an intangible concept, it is possible to determine whether a station tends toward one end of the continuum or the other.

Commercial nuclear power plants are designed, built and operated to produce electricity. Safety, production and cost control are necessary goals for the operation of such a plant. These outcomes are quite complementary and most plants today achieve high levels of safety, impressive production records and competitive costs, reinforced by decisions and actions made with a long-term view taken into account. This perspective keeps safety as the overriding priority for each plant and for each individual associated with the plant.

Nuclear safety culture is a leadership responsibility. Experience has shown that leaders in organisations with a healthy safety culture foster safety culture through activities such as the following:

• Leaders reinforce safety culture at every opportunity. A safety culture's health is not taken for granted.

- Leaders frequently measure a safety culture's health by focusing on trends rather than absolute values.

- Leaders communicate what constitutes a healthy safety culture and ensure everyone understands his or her role in its promotion.

- Leaders recognise that safety culture is not all or nothing, instead it is constantly moving along a continuum. As a result, there is a comfort in discussing safety culture within the organisation as well as with outside groups, such as regulatory agencies.

The traits described in this document are divided into three categories that are similar to the three categories of safety culture in International Nuclear Safety Advisory Group (INSAG)-4, Safety Culture. The categories and their primary traits are as follows:

- Individual Commitment to Safety

    - Personal Accountability
    - Questioning Attitude
    - Safety Communication

- Management Commitment to Safety

    - Leadership Accountability
    - Decision-Making
    - Respectful Work Environment

- Management Systems

    - Continuous Learning
    - Problem Identification and Resolution
    - Environment for Raising Concerns
    - Work Processes

Principles

Individual Commitment to Safety

1. Personal Accountability (PA)

    All individuals take personal responsibility for safety. Responsibility and authority for nuclear safety are well defined and clearly understood. Reporting relationships, positional authority and team responsibilities emphasise the overriding importance of nuclear safety.

    Attributes:

PA.1	Standards: Individuals understand the importance of adhering to nuclear standards. All levels of the organisation exercise accountability for shortfalls in meeting these standards.
PA.2	Job Ownership: Individuals understand and demonstrate personal responsibility for the behaviours and work practices that support nuclear safety.
PA.3	Teamwork: Individuals and work groups communicate and coordinate their activities within and across organisational boundaries to ensure nuclear safety is maintained.

2. Questioning Attitude (QA)

Individuals avoid complacency and continuously challenge existing conditions, assumptions, anomalies and activities to identify discrepancies that might result in errors or inappropriate actions. All employees are watchful for assumptions, values, conditions or activities that can have an undesirable effect on plant safety.

Attributes:

QA.1	Nuclear is Recognised as Special and Unique: Individuals understand that complex technologies can fail in unpredictable ways.
QA.2	Challenge the Unknown: Individuals stop when faced with uncertain conditions. Risks are evaluated and managed before work proceeds.
QA.3	Challenge Assumptions: Individuals challenge assumptions and offer opposing views when they believe something is not correct.
QA.4	Avoid Complacency: Individuals recognise and plan for the possibility of mistakes, latent issues and inherent risk, even while expecting successful outcomes.

3. Safety Communication (CO)

Communications maintain a focus on nuclear safety. Safety communication is broad and includes plant-level communication, job-related communication, worker-level communication, equipment labelling, operating experience and documentation. Leaders use formal and informal communication to convey the importance of nuclear safety. The flow of information up the organisation is viewed as just as important as the flow of information down the organisation.

Attributes:

CO.1	Work Process Communications: Individuals incorporate safety communications in work activities.
CO.2	Bases for Decisions: Leaders ensure that the bases for operational and organisational decisions are communicated in a timely manner.
CO.3	Free Flow of Information: Individuals communicate openly and candidly, both up, down and across the organisation and with oversight, audit and regulatory organisations.
CO.4	Expectations: Leaders frequently communicate and reinforce the expectation that nuclear safety is the organisation's overriding priority.

Management Commitment to Safety

1. Leadership Accountability (LA)

Leaders demonstrate a commitment to nuclear safety in their decisions and behaviours. Executives and senior managers are the leading advocates of nuclear safety and demonstrate their commitment both in word and action. The nuclear safety message is communicated frequently and consistently,

occasionally as a stand-alone theme. Leaders throughout the nuclear organisation set an example for safety. Corporate policies emphasise the overriding importance of nuclear safety.

Attributes:

LA.1	Resources: Leaders ensure that personnel, equipment, procedures and other resources are available and adequate to support nuclear safety.
LA.2	Field Presence: Leaders are commonly seen in working areas of the plant observing, coaching and reinforcing standards and expectations. Deviations from standards and expectations are corrected promptly.
LA.3	Incentives, Sanctions and Rewards: Leaders ensure incentives, sanctions and rewards are aligned with nuclear safety policies and reinforce behaviours and outcomes that reflect nuclear safety as the overriding priority.
LA.4	Strategic Commitment to Safety: Leaders ensure plant priorities are aligned to reflect nuclear safety as the overriding priority.
LA.5	Change Management: Leaders use a systematic process for evaluating and implementing change so that nuclear safety remains the overriding priority.
LA.6	Roles, Responsibilities and Authorities: Leaders clearly define roles, responsibilities and authorities to help ensure nuclear safety.
LA.7	Constant Examination: Leaders ensure that nuclear safety is constantly scrutinised through a variety of monitoring techniques, including assessments of nuclear safety culture.
LA.8	Leader Behaviours: Leaders exhibit behaviours that set the standard for safety.

2. Decision Making (DM)

Decisions that support or affect nuclear safety are systematic, rigorous and thorough. Operators are vested with the authority and understand the expectation, when faced with unexpected or uncertain conditions, to place the plant in a safe condition. Senior leaders support and reinforce such conservative decisions.

Attributes:

DM.1	Consistent Process: Individuals use a consistent, systematic approach to make decisions. Risk insights are incorporated, as appropriate.
DM.2	Conservative Bias: Individuals use decision-making practices that emphasise prudent choices over those that are simply allowable. For example, a proposed action is determined to be safe before proceeding, rather than determined to be unsafe before stopping.
DM.3	Accountability for Decisions: Individual or single-point accountability is maintained for nuclear safety decisions.

3. Respectful Work Environment (WE)

Trust and respect permeate the organisation, creating a respectful work environment. A high level of trust is established in the organisation, in part, fostered through timely and accurate communication. Differing professional opinions are encouraged, discussed and resolved in a timely manner. Employees are informed of steps taken in response to their concerns.

Attributes:

WE.1	Respect is Evident: Everyone is treated with dignity and respect.
WE.2	Opinions are Valued: Individuals are encouraged to voice concerns, provide suggestions and raise questions. Differing opinions are also encouraged and respected.
WE.3	High Level of Trust: Trust is fostered among individuals and work groups throughout the organisation.
WE.4	Conflict Resolution: Fair and objective methods are used to resolve conflicts.

Management Systems

1. Continuous Learning (CL)

Opportunities to continuously learn are valued, sought out and implemented. Operating experience is highly valued and the capacity to learn from experience is well developed. Self-assessments, training and benchmarking are used to stimulate learning and improve performance. Nuclear safety is kept under constant scrutiny through a variety of monitoring techniques, some of which provide an independent or "fresh look".

Attributes:

CL.1	Operating Experience: Relevant internal and external operating experience is systematically and effectively collected, evaluated and lessons learned are implemented in a timely manner by the organisation.
CL.2	Self-Assessment: The organisation routinely conducts self-critical and objective assessments of its programmes, practices and performance.
CL.3	Benchmarking: The organisation learns from other organisations in order to continuously improve knowledge, skills and safety performance
CL.4	Training: High-quality training maintains a knowledgeable workforce and reinforces high standards for maintaining nuclear safety.

2. Problem Identification and Resolution (PI)

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 organisational issues, are used to strengthen nuclear safety and improve performance.

Attributes:

PI.1	Identification: The organisation implements a corrective action programme with a low threshold for identifying issues. Individuals identify issues in a timely manner and in accordance with the programme expectations.
PI.2	Evaluation: The organisation thoroughly evaluates issues to ensure that problem resolutions and solutions address causes and extents of conditions commensurate with their nuclear safety significance.
PI.3	Resolution: The organisation takes effective corrective actions to address issues in a timely manner, commensurate with their nuclear safety significance.
PI.4	Trending: The organisation periodically analyses information from the corrective action programme and other assessments in the aggregate to identify adverse trends or conditions.

3. Environment for Raising Concerns (RC)

A safety-conscious work environment (SCWE) is maintained where personnel feel free to raise nuclear safety concerns without fear of retaliation, intimidation, harassment or discrimination. Station managers create, maintain and periodically evaluate policies and processes that allow personnel to freely raise such concerns.

Attributes:

RC.1	SCWE Policy: The organisation implements a policy that supports individual rights and responsibilities to raise nuclear safety concerns, and does not tolerate harassment, intimidation, retaliation or discrimination for doing so.
RC.2	Alternate Process for Raising Concerns: The organisation implements a process for raising and resolving concerns that is independent of line management influence. Nuclear safety issues may be raised in confidence and with an expectation that they be resolved in a timely and effective manner.

4. Work Processes (WP)

The process of planning and controlling work activities is implemented so that nuclear safety is maintained. Work management is a deliberate process in which work is identified, selected, planned, scheduled, executed, closed and critiqued. The entire organisation is involved in and fully supports the work management process.

Attributes:

WP.1	Work Management: The organisation implements a process of planning, controlling and executing work activities such that nuclear safety is the overriding priority. The process includes the identification and management of nuclear safety risk commensurate with the work to be performed.
WP.2	Design Margins: The organisation operates and maintains equipment within design margins. Margins are carefully guarded and changed only through a systematic and rigorous process. Special attention is placed on maintaining fission product barriers, defence-in-depth and the operability and function of safety-related equipment.

WP.3	Documentation: The organisation creates and maintains complete, accurate and up-to-date documentation.
WP.4	Procedure Adherence: Individuals properly follow processes, procedures and work instructions.

This page is left blank intentionally

This page is left blank intentionally

This page is left blank intentionally

This page is left blank intentionally

ATLANTA
LONDON & HONG KONG
MOSCOW
PARIS
TOKYO

WORLD ASSOCIATION OF NUCLEAR OPERATORS

www.wano.org & www.wano.info