IAEA 60 Years
Atoms for Peace and Development

Safety Culture and the IAEA International Perspectives

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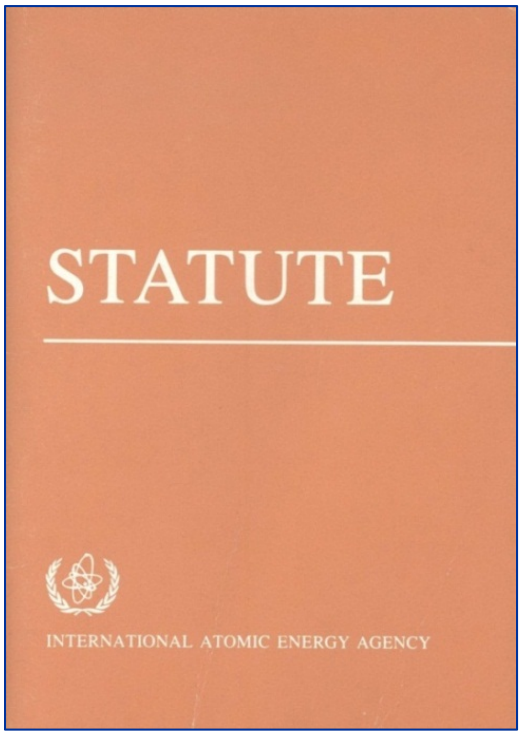
Nuclear Regulatory Commission 29th Annual Regulatory Information Conference
Bethesda, Maryland, USA

Overview

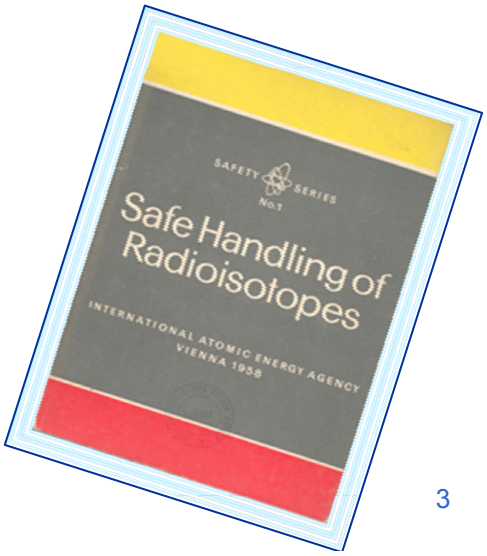
- IAEA Programme on Decommissioning & Safety Culture
  - To develop and maintain a set of safety standards
  - To organize international meetings and projects
  - To offer peer review and advisory services to Member States (regulatory authorities and licensees)
  - To organize training events for capacity building
- Decommissioning in Europe: Status and Issues

IAEA Statute



The IAEA Safety Standards have a status derived from the IAEA's Statute, which authorizes the IAEA *"To establish or adopt, in consultation and, where appropriate, in collaboration with the competent organs of the United Nations and with the specialized agencies concerned, standards of safety for protection of health and minimization of danger to life and property ... and to provide for the application of these standards".*

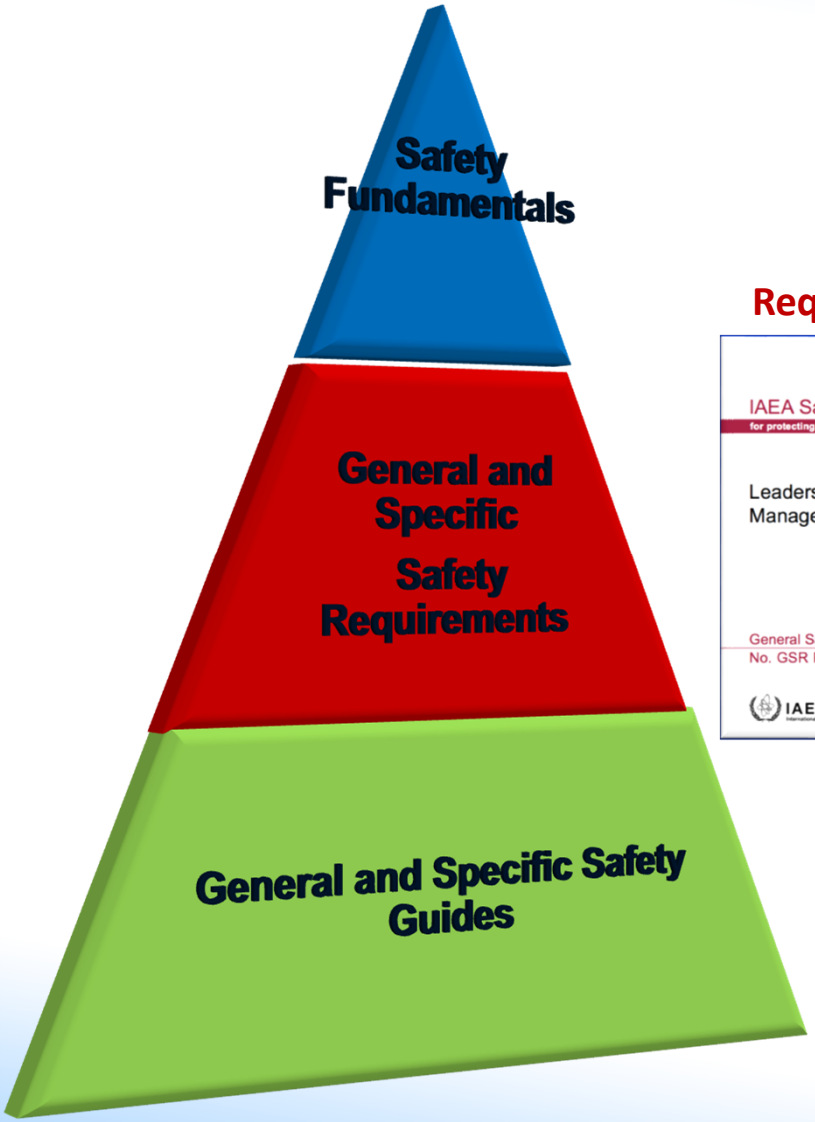
In **1958**, the IAEA published its first Safety Standard, Safety Series No. 1, **Safe Handling of Radioisotopes**. Over the years, more than 200 publications were issued in the Safety Series.

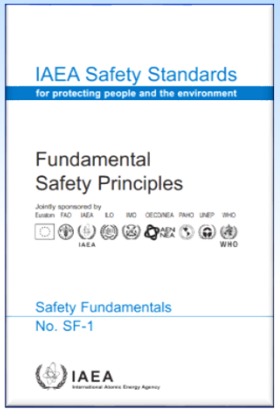


Safety Culture

- *Safety Culture is that assembly of characteristics and attitudes in **organizations** and **individuals** which establishes that, as an overriding priority, protection and safety issues receives the attention warranted by their significance.*
- This statement was carefully composed to emphasize that Safety Culture is attitudinal as well as structural, relates both to organizations and individuals, and concerns the requirement to match all safety issues with appropriate perceptions and action.

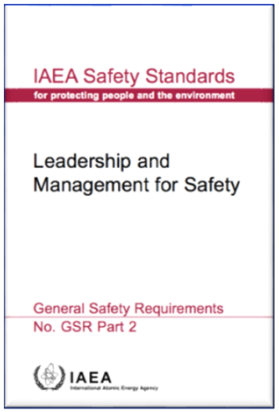
Safety Culture in the Safety Standards Hierarchy

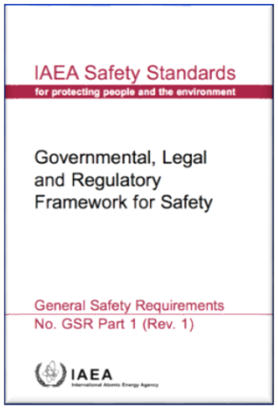


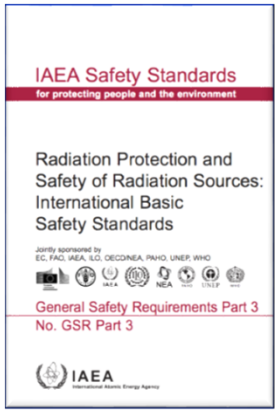


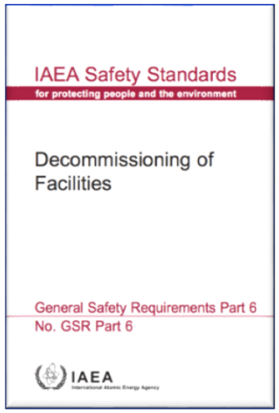
Fundamental Safety Principles

Requirements – Legal, Technical & Procedural Safety Imperatives

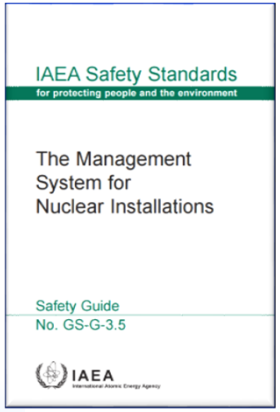


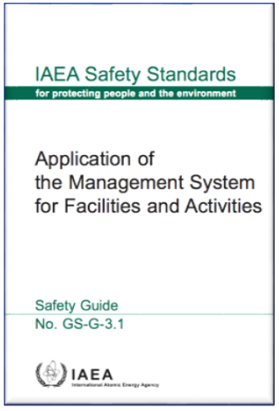






Guidance on Best Practice to meet Requirements





http://www-ns.iaea.org/standards/default.asp

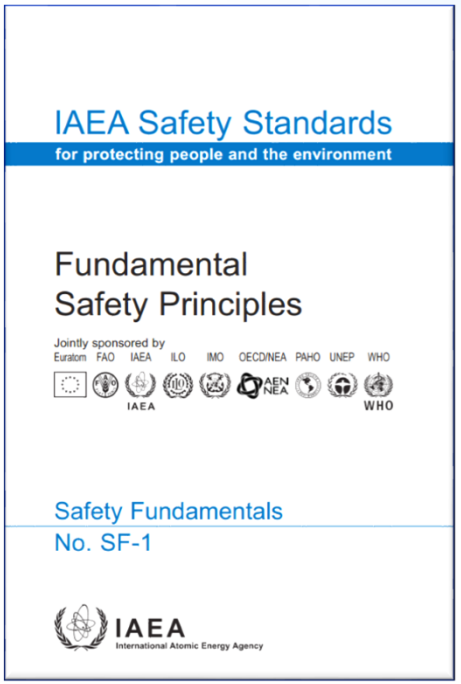
IAEA Safety Culture
Safety Fundamentals

Principle 3: Leadership and management for safety

- Effective leadership and management for safety must be established and sustained in organizations concerned with, and facilities and activities that give rise to, radiation risks.

Integration of safety culture

- 3.12. The management system also has to ensure the promotion of a safety culture, the regular assessment of safety performance and the application of lessons learned from experience.
- 3.13. A safety culture that governs the attitudes and behaviour in relation to safety of all organizations and individuals concerned must be integrated in the management system. Safety culture includes:
  - Individual and collective **commitment** to safety on the part of the leadership, the management and personnel at all levels;
  - **Accountability** of organizations and of individuals at all levels for safety;
  - Measures to encourage a **questioning and learning attitude** and to discourage complacency with regards to safety."



IAEA Safety Culture Safety Requirements

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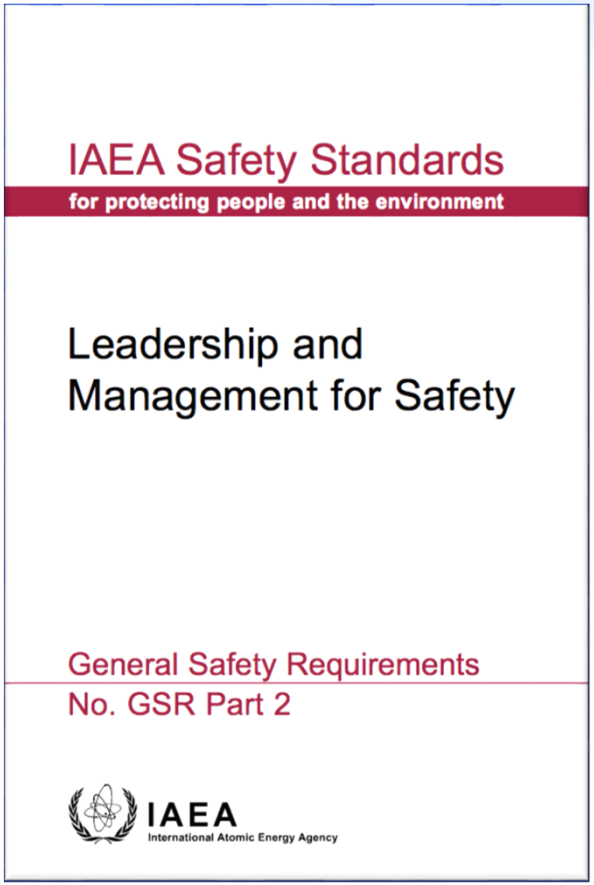
5. **CULTURE FOR SAFETY**

- **Requirement 12**: Fostering a culture for safety 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.
- 5.1. All individuals in the organization shall contribute to fostering and sustaining a strong safety culture.
- 5.2. Senior managers and all other managers shall advocate and support the following:
  - (a) A common understanding of safety and of safety culture, including: awareness of radiation risks and hazards relating to work and to the working environment; an understanding of the significance of radiation risks and hazards for safety; and a collective commitment to safety by teams and individuals;
  - (b) Acceptance by individuals of personal accountability for their attitudes and conduct with regard to safety; The capability of the organization to have a clear understanding and knowledge of the product or service to be supplied is sometimes termed an 'informed customer' capability.
  - (c) An organizational culture that supports and encourages trust, collaboration, consultation and communication;
  - (d) The reporting of problems relating to technical, human and organizational factors and reporting of any deficiencies in structures, systems and components to avoid degradation of safety, including the timely acknowledgement of, and reporting back of, actions taken;
  - (e) Measures to encourage a questioning and learning attitude at all levels in the organization and to discourage complacency with regard to safety;
  - (f) The means by which the organization seeks to enhance safety and to foster and sustain a strong safety culture, and using a systemic approach (i.e. an approach relating to the system as a whole in which the interactions between technical, human and organizational factors are duly considered);
  - (g) Safety oriented decision making in all activities;
  - (h) The exchange of ideas between, and the combination of, safety culture and security culture.



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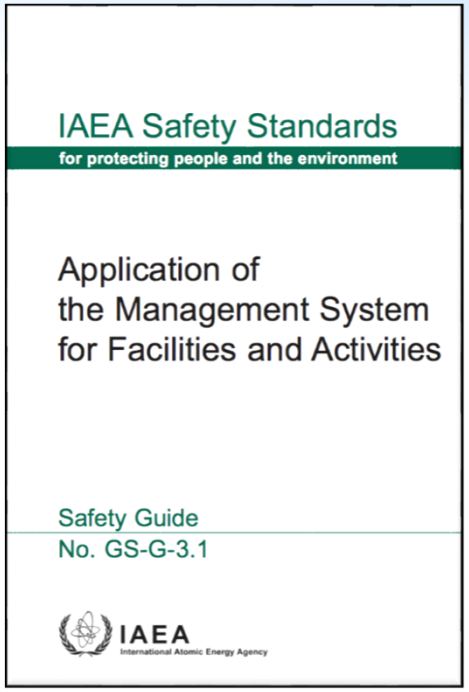
IAEA Safety Culture Characteristics and Attributes

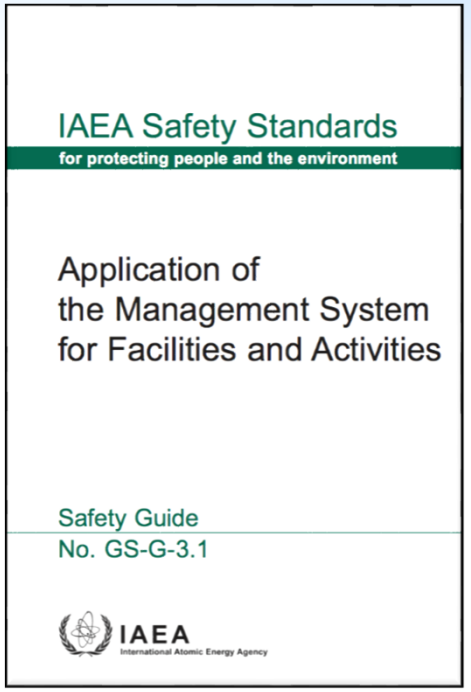


- The high priority given to safety is shown in documentation, communications and decision making.
- Safety is a primary consideration in the allocation of resources.
- The strategic business importance of safety is reflected in the business plan.
- Individuals are convinced that safety and production go hand in hand.
- A proactive and long term approach to safety issues is shown in decision making.
- Safety conscious behaviour is socially accepted and supported (both formally and informally).

Slide 8

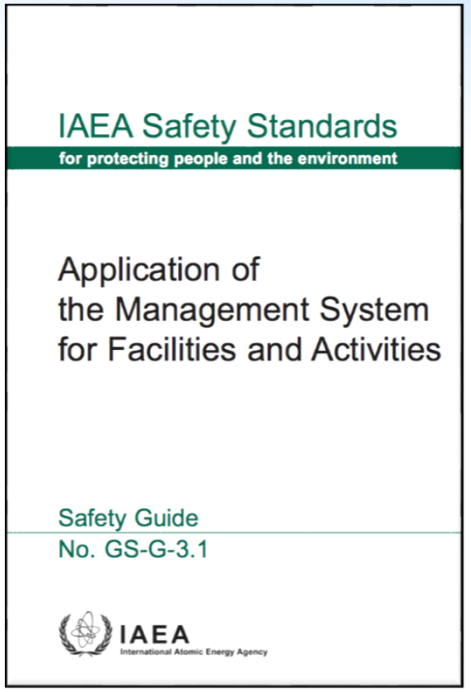
s1 Microsoft account, 2/26/2017

IAEA Safety Culture Characteristics and Attributes



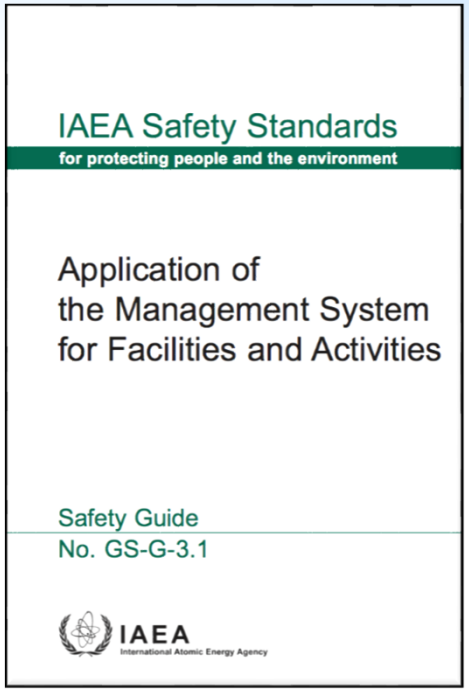
- Senior management is clearly committed to safety.
- Commitment to safety is evident at all levels of management.
- There is visible leadership showing the involvement of management in safety related activities.
- Leadership skills are systematically developed.
- Management ensures that there are sufficient competent individuals.
- Management seeks the active involvement of individuals in improving safety.
- Safety implications are considered in change management processes.
- Management shows a continual effort to strive for openness and good communication throughout the organization.
- Management has the ability to resolve conflicts as necessary.
- Relationships between managers and individuals are built on trust.

IAEA Safety Culture Characteristics and Attributes



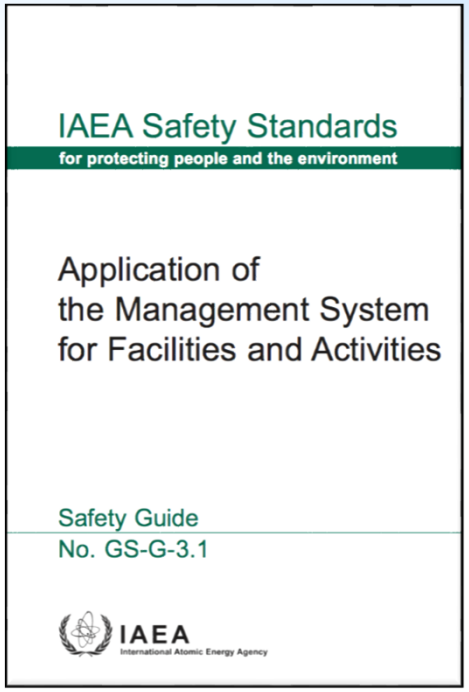
- Trust permeates the organization.
- Consideration of all types of safety, including industrial safety and environmental safety, and of security is evident.
- The quality of documentation and procedures is good.
- The quality of processes, from planning to implementation and review, is good.
- Individuals have the necessary knowledge and understanding of the work processes.
- Factors affecting work motivation and job satisfaction are considered.
- Good working conditions exist with regard to time pressures, workload and stress.
- There is cross-functional and interdisciplinary cooperation and teamwork.
- Housekeeping and material conditions reflect commitment to excellence.

IAEA Safety Culture Characteristics and Attributes



- A questioning attitude prevails at all organizational levels.
- Open reporting of deviations and errors is encouraged.
- Internal and external assessments, including self-assessments, are used.
- Organizational experience and operating experience (both internal and external to the facility) are used.
- Learning is facilitated through the ability to recognize and diagnose deviations, to formulate and implement solutions and to monitor the effects of corrective actions.
- Safety performance indicators are tracked, trended, evaluated and acted upon.
- There is systematic development of individual competences.

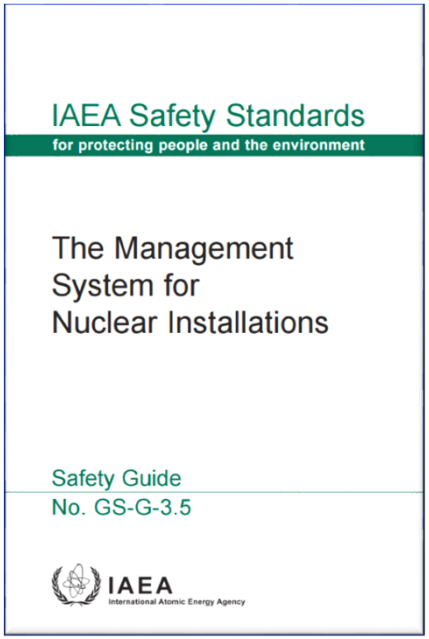
IAEA Safety Culture Characteristics and Attributes



- An appropriate relationship with the regulatory body exists that ensures that the accountability for safety remains with the licensee.
- Roles and responsibilities are clearly defined and understood.
- There is a high level of ~~compliance~~ [performance] with regulations and procedures.
- Management delegates responsibility with appropriate authority to enable clear accountabilities to be established.
- 'Ownership' for safety is evident at all organizational levels and for all individuals.

ASSESSMENT OF SAFETY CULTURE

- Provides detail guidance on:
  - Self-assessments
    - 6.35. The self-assessment of safety culture should include the entire organization. Several different self-assessment tools should be used to determine the status of the safety culture of the organization. …
  - Independent Assessments
    - 6.38. The independent assessment of safety culture should follow a similar approach to that used for the self-assessment and should also include all characteristics of safety culture. … The team should be staffed with sufficient diversity of experience and should include specialists in behavioural science, with knowledge of statistical methods of analysis.
    - 6.39. The independent assessment team should aim at identifying strengths and areas for improvement and may recommend or suggest actions to be taken.



Safety Reports and TECDOCs

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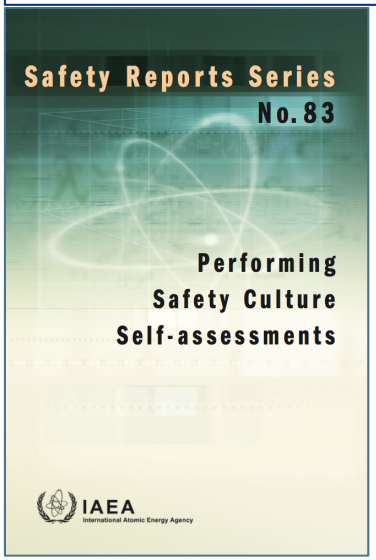
Safety Report Series

SRS No. 11	Developing Safety Culture in Nuclear Activities — Practical Suggestions to Assist Progress	1998
SRS No. 26	Safe Enclosure of Nuclear Facilities During Deferred Dismantling	2002
SRS No. 31	Managing the Early Termination of Operation of Nuclear Power Plants	2003
SRS No. 36	Safety Considerations in the Transition from Operation to Decommissioning of Nuclear Facilities	2004
SRS No. 42	Safety Culture in the Maintenance of Nuclear Power Plants	2005
SRS No. 45	Standard Format and Content for Safety Related Decommissioning Documents	2005
SRS No. 50	Decommissioning Strategies for Facilities Using Radioactive Material	2007
SS No. 75	INSAG-4: Safety Culture	1991
SS No. 75	INSAG-15: Key Practical Issues in Strengthening Safety Culture	2002



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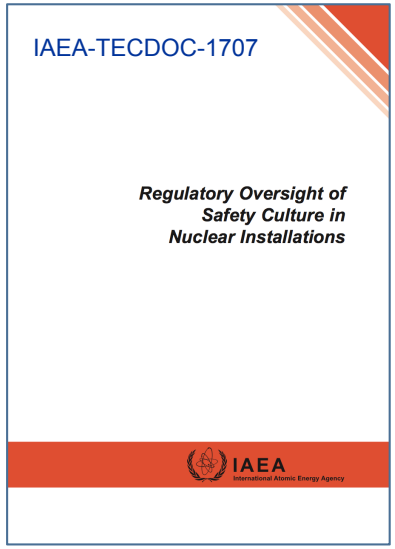
IAEA
International Atomic Energy Agency

Technical Meeting
on Safety Culture during the Transition from the Decision to Shut Down
to the Decommissioning of Nuclear Facilities

IAEA Headquarters
Vienna, Austria
14–17 December 2015



Technical Documents (TECDOCs)

IAEA-TECDOC-1321	Self-Assessment of Safety Culture in Nuclear Installations	2002
IAEA-TECDOC-1329	Safety Culture in Nuclear Installations	2002
IAEA-TECDOC-1394	Planning, Managing and Organizing the Decommissioning of Nuclear Facilities: Lessons Learned	2004
IAEA-TECDOC-1702	Planning, Management and Organizational Aspects in Decommissioning of Nuclear Facilities	2013

Implementation & Capacity Building

SAFETY CULTURE CONTINUOUS IMPROVEMENT PROCESS

Background and objective

- The IAEA offers comprehensive **support to licensees and regulatory bodies** wishing to systematically improve safety culture. An effective way of doing this is to conduct safety culture assessments and implement improvement activities based upon their findings. By training a safety culture improvement team, consisting of personnel from different departments as well as different hierarchical levels, the receiving organization develops in-house understanding and expertise on the topic, making safety culture understandable, tangible and workable. This creates a sustainable basis not only for conducting safety culture self-assessments, but also for continuous implementation of safety culture improvement activities.

- The IAEA has developed the **Safety Culture Continuous Improvement Process** (SCCIP) to assist Member States in strengthening and improving their organizational safety culture; it is a **comprehensive process comprising four core steps**:

Step 1: Attend a **three-day Senior Management Workshop**. Best practices in nuclear safety confirm that when senior managers show visible involvement and interest in improving safety culture, safety performance improves. As a first step, this process begins by engaging Senior Management and providing them with concrete concepts and methodologies used for improving and strengthening safety culture. It also provides them guidance on selecting the members of an internal safety culture improvement team that will assess and implement safety culture activities within the organization. The selection should reflect both the organization's different departments and hierarchy levels. Strong, visible, consistent senior management commitment, leadership and support is essential for the success of the SCCIP. •

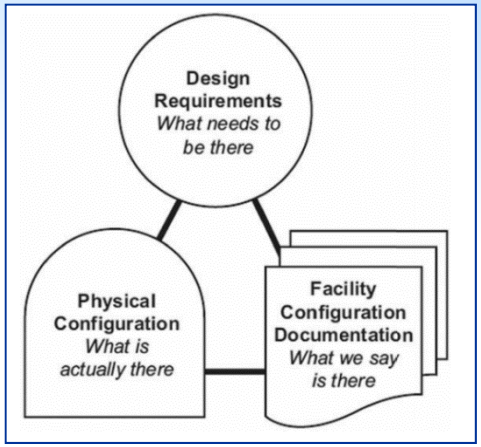
Step 2: Attend a **ten-day safety culture improvement team training**. This step involves training the safety culture improvement team appointed by senior management. The team will develop competency in various safety culture principles, safety culture assessment techniques, and safety culture improvements to change elements of safety culture with the aim of improving safety performance. The training is split into two parts with approximately a month break in between each part, during which time the team is assigned course literature to read. (The IAEA offers an add-on module for regulatory bodies or corporate organizations on safety culture oversight.)

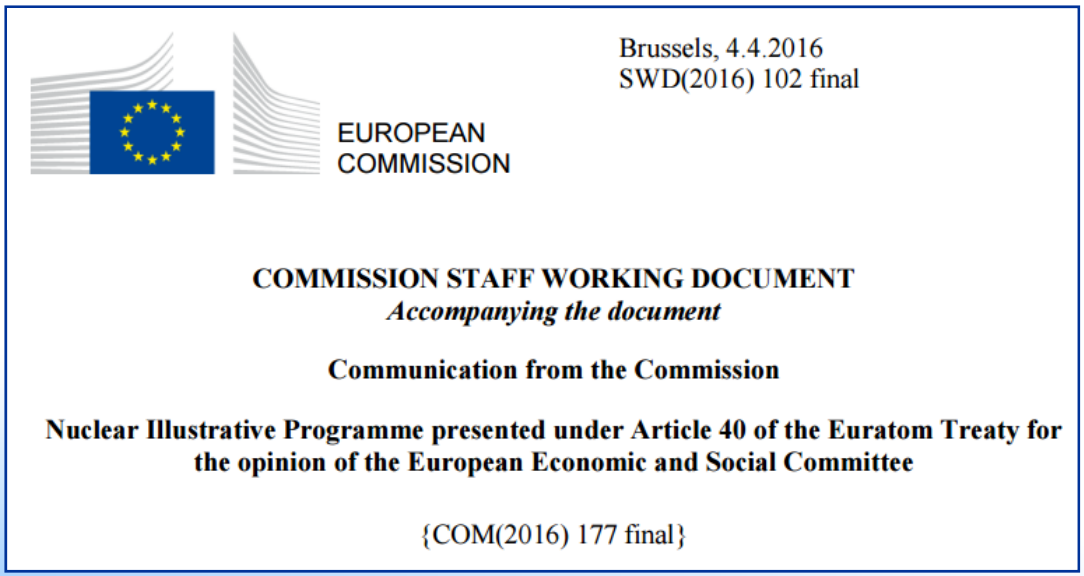
Step 3: Conduct **a safety culture self-assessment**. In this step, the newly trained safety culture improvement team will collect the assessment data and perform the preliminary analyses of this data. They can, upon request, receive IAEA's support throughout the assessment process via tailored support missions based upon their needs.

Step 4: Finalize the last steps of the safety culture analyses. The final step involves an IAEA support mission where an IAEA expert team works together with the newly trained safety culture improvement team to **identify strengths and areas for improvements**. Time is also allocated to suggest appropriate improvement activities.

Common Issues

- Costing and Financing
- Transition from Licensed Operator to Decommissioning Contractor
- Adequacy of Legacy Records to identify hazards
- Availability of Disposal Paths, Waste Classifications
- Stakeholder Concerns (safety and economic)
- Workforce issues





EUROPEAN COMMISSION

Brussels, 4.4.2016
SWD(2016) 102 final

COMMISSION STAFF WORKING DOCUMENT
Accompanying the document

Communication from the Commission

Nuclear Illustrative Programme presented under Article 40 of the Euratom Treaty for the opinion of the European Economic and Social Committee

{COM(2016) 177 final}

Nuclear reactors in shut down status per EU MS and technology (PRIS Jan 2016)

	BWR	FBR	GCR	HTGR	HWGCR	LWGR	PHWR	PWR	SGHWR	Total
BE								1		1
BG								4		4
DE	9	1		2	1		1	14		28
ES	1		1					1		3
FR		2	8		1			1		12
IT	2		1					1		4
LT						2				2
NL	1									1
SE	2						1			3
SK					1			2		3
UK		2	27						1	30
Total	**15**	**5**	**37**	**2**	**3**	**2**	**2**	**24**	**1**	**91**

Decommissioning Strategy

Immediate dismantling	Deferred dismantling	No preferred option
Belgium Bulgaria Spain Finland (Loviisa) France Croatia Italy (Note 1) Lithuania Netherlands (Borssele) Sweden Slovenia Slovakia (Note 2)	Finland (Olkiluoto) Hungary Netherlands (Dodewaard) Romania United Kingdom	Czech Republic Germany

- Note 1 Italian NPPs have been formally under an operating mode status for many years after stopping producing electricity.
- Note 2 Decommissioning plans for JE V2 have not been decided and consider both options as possible. Source: (Slovakian National Nuclear Fund, 2014).

Nuclear Illustrative Programme presented under Article 40 of the Euratom Treaty for the opinion of the European Economic and Social Committee {COM(2016) 177 final}

Estimated costs of decommissioning EU NPPs

MS	Estimated Decommissioning costs (EUR billion, note 1)	Total NPPs			Estimated cost of decommissioning (EUR billion per unit)	Estimated cost of decommissioning (EUR billion per GWe)
		Units	Capacity (MWe)	Average capacity		
BE[123]	3,7	8	5 931	741	0,5	0,6
BG[124]	3,0	6	3 558	593	0,5	0,8
CZ	1,5	6	3 904	651	0,3	0,4
DE	38,0 (note 2)	36	26 375	733	1,1	1,4
ES	4,5	10	8 188	819	0,5	0,6
FI[125]	1,0	4	2 752	688	0,3	0,4
FR	22,6	70	66 919	956	0,3	0,3
HR	0,2	0,5 (note 3)	344	344	0,4	0,6
HU	1,2	4	1 889	472	0,3	0,7
IT	Not available	4	1 423	356	NA	NA
LT	2,6	2	2 370	1 185	1,3	1,1
NL	Not available	2	537	269	NA	NA
RO[126]	1,4	2	1 300	650	0,7	1,1
SE	3,4	13	10 861	835	0,3	0,3
SI[127]	0,2	0,5 (note 3)	344	344	0,4	0,6
SK[128]	3,1	9	3 665	407	0,3	0,9
UK[129]	36,9	45	13 598	302	0,8	2,7
Totals Note 4	**123,3**	**222**	**151 998**	**704**	**0,6**	**0,8**

Source: Nuclear Illustrative Programme presented under Article 40 of the Euratom Treaty for the opinion of the European Economic and Social Committee {COM(2016) 177 final}

Waste management estimates reported by Member States (including costs for the building of geological repositories)

MS	Estimated Waste Management costs (EUR billion)	Lifetime electricity supplied from NPPs [TWh]			Estimated cost of waste management (EUR per MWh)
		Average lifetime load factor[132]	Actual electricity supplied as of Sep 2015	Estimated future electricity supplied, considering official LTOs	Total
BE[133]	7,0	84%	1 399	349	1 748	4,0
BG	0,5	65%	518	288	807	0,6
CZ	5,0	82%	515	819	1 334	3,8
DE Note 1	7,7	88%	4 836	398	5 234	1,5
ES[134]	10,0	85%	1 740	1 297	3 037	3,3
FI	5,6	91%	697	344	1 041	5,4
FR[135]	45,8	73%	11 873	9 203	21 076	2,2
HR	0,5	84%	78	60	138	3,7
HU	4,3	86%	389	234	624	6,8
IT	Not available	NA	143	0	143	NA
LT	3,2	NA	311	0	311	10,3
NL	Not available	84%	148	54	202	NA
RO	2,8	92%	133	315	448	6,3
SE	7,6	75%	2 200	1 186	3 386	2,2
SI	0,5	84%	78	60	138	3,7
SK	5,0	81%	412	295	707	7,1
UK	24,1	70%	2 629	817	3 445	7,0
Totals	**129,6**	**77%**	**28 098**	**15 718**	**43 816**	**3,0**

Source: Nuclear Illustrative Programme presented under Article 40 of the Euratom Treaty for the opinion of the European Economic and Social Committee {COM(2016) 177 final}

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Thank you!