

Harmonisation of nuclear safety requirements and regulatory control in the European Union

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Director General
Jukka Laaksonen

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What is meant by harmonisation? (1)

WENRA working group proposal:

- *“There are no substantial differences between countries from the safety point of view in generic formally issued national safety requirements, and in the resulting implementation on the Nuclear Power Plants.”*

This means that a harmonised safety level must have a legal basis.

What is meant by harmonisation? (2)

European Commission vision?:

- Nuclear legislation in all European Union member states is based on a Council Directive that provides mandatory nuclear safety requirements (whatever they may be!).
- Commission supervises nuclear safety regulation in all EU area, and has a mandate to enforce binding safety requirements.

What is meant by harmonisation? (3)

WENRA working group proposal and EC vision look much different, but it would be possible to fit both ideas together.

This would require that

- highest priority is put on nuclear safety, and not on political objectives regarding the use of nuclear energy
- the Commission is ready to listen to the advice of nuclear safety experts

International Nuclear Safety Convention (1)

Nuclear Safety Convention (NSC) is in force since 1996.

- Convention text has its roots in communication of the Commission to the Council (COM (81) 519) drafted by the EC's "Working Group 1" in 1981.
- IAEA Safety Fundamentals document issued in 1993 is a further development of the EC document.
- NSC text is one step further from the IAEA Safety Fundamentals.

International Nuclear Safety Convention (2)

- All IAEA member states operating NPP's, except India, have committed to meet the nuclear safety requirements included in the NSC.
- If correctly used and interpreted, NSC provides a strong basis for harmonisation.
- Two rounds of reporting and review meetings have been conducted (1999, 2002)
 - the review process has resulted in genuine efforts to improve safety in participating countries and has contributed towards international harmonisation.
- Both the regulators and the operators have been involved in reporting and review.

European Commission efforts towards harmonisation (1)

The first political action towards harmonising safety practices was the Council Resolution of 22 July 1975 on the technological problems of nuclear safety.

- this resolution has served as a mandate for the “Working Group 1” that was created by the Commission at the end of 1972
- WG 1 was composed of regulators, utilities and vendors from member states
- nuclear regulators started their own WG 1A in late 1970’s, and 1992 the group was renamed Nuclear Regulators Working Group (NRWG)
- in the WGs the experts have exchanged information on their national practices, and developed joint recommendations on specific topics

European Commission efforts towards harmonisation (2)

Among the documents issued by the WG's are the following:

- Consensus document on safety of LWR (1988)
 - personnel training, in-service inspections, emergency planning, etc.
- Consensus document on safety of European LWR (1995)
 - safety in operation, severe accidents, etc.
- Common position of the European regulators on qualification of NDT systems for pre- and in-service inspection of LWR components (1996)
- Common position of the European regulators for the licensing of safety critical software for nuclear reactors

WGs have significantly promoted EU wide co-operation and have no doubt brought some harmonisation.

European Commission efforts towards harmonisation (3)

To day there is a strong political will within the European Commission to develop a Community approach to nuclear safety, consisting of two elements:

- a body of common nuclear safety standards, and
- a mechanism to verify compliance with them, including sanctions if not complied with.

The main political driving force is the EU enlargement which has brought the issue of nuclear safety on the table

- Commission attempts to have a new nuclear safety directive in force no later than at the time of enlargement (1 January, 2004).

European Commission efforts towards harmonisation (4)

Up to now the commonly agreed interpretation of the Euratom treaty from 1957 has been that it does not give any mandate to the Commission in the nuclear safety matters.

- Originally, the main purpose of the Euratom treaty was to ensure supply of nuclear fuel to member states and safeguards of nuclear materials
- The treaty also provides a framework for regulation of radiation protection.

A new interpretation proposed by the Commission is that the treaty also provides a legal mandate for nuclear safety “because prevention of nuclear accidents is part of the radiation protection”.

- Such new interpretation raises questions because the Commission has to day no competence on nuclear safety, and the staffs seem not to have a clear idea of the nature of “the harmonised nuclear safety standards”.

European Commission efforts towards harmonisation (5)

In July this year, the Commission provided a draft nuclear safety directive informally to a limited number of experts for getting their first comments. The draft had been prepared by the Commission staff without any external support.

- Informal comments were asked from the national nuclear regulators through WENRA (Western European Nuclear Regulators Association).
- WENRA comments were very critical and did not support the proposed draft.
- Some WENRA members felt that it was not appropriate to give comments “behind the back of their Governments”, although there was a wide consensus on the text of comments.

European Commission efforts towards harmonisation (6)

The formal procedure in preparing the Council Directives or other Council Decisions under Euratom Treaty is as follows:

- Commission presents its draft proposal to the “Article 31” group that consists of national experts in radiation protection matters
- Draft is revised in discussions between “Article 31” group and Commission
- Commission presents the revised text to the Atomic Questions Group (AQG) that consists of representatives of Governments
- Comments are requested also from Economical & Social Committee and European Parliament during preparation
- Based on the position of AQG, Commission presents the final proposal for the Council of Ministers

Commission decided on Nov 6 (2002) to start this procedure, and published the draft proposal which will go to “Article 31” group.

European Commission efforts towards harmonisation (7)

Key ideas for the draft directive: Safety requirements

- The safety requirements in the first “framework directive” to be issued before 1 January 2004 would be taken directly from the Nuclear Safety Convention.
- Development of additional safety standards (given in a revised directive?) would start as soon as the first directive is in force.
- The new requirements would be based on IAEA safety standards.

Note: In order to provide necessary nuclear safety knowledge to preparation of new standards, the Commission should develop a new procedure, or at least change the membership of the “Article 31” group.

European Commission efforts towards harmonisation (8)

Key ideas for the draft directive: EU level nuclear regulation

- Commission would conduct inspections to verify that the Safety Authorities of each member state carry out their tasks as required in the nuclear safety directive.
- Each country would nominate experts for an “expert pool” from which the Commission could pick up the experts for verification missions.
- This “peer review” activity would be fully managed by the Commission, and the Commission could also decide on the corrective actions required on the basis of recommendations.

(Note: the proposed mandate of the Commission is somewhat unclear; it is still described in the Explanatory Memorandum to the draft directive, but has been removed from the latest version of the text of the directive)

European Commission efforts towards harmonisation (9)

There are some concerns on possible misunderstandings and unrealistic thoughts within the Commission.

Some notes on the nature of nuclear safety and the safety standards are therefore made in the following two slides.

European Commission efforts towards harmonisation (10)

Notes on nature of safety standards and verification of their fulfilment:

- For achieving a high level of nuclear safety, it is not enough to meet a certain set of safety limits. While safety requirements for areas such as radiation protection can be presented and their fulfilment can be verified in a quite straightforward and measurable manner, this is not true for the nuclear safety area.
- There are different alternative means to achieve the same safety goal, and the judgement on adequacy of safety level is always more or less subjective. One cannot prove in a credible manner that the overall safety level of one facility is higher than the safety level of a different facility.
- A necessary condition for a qualified safety judgement is a thorough understanding of how various safety relevant factors are integrated to a whole. This is why there is a wide consensus that qualified national authorities are needed to draw the conclusion on adequate nuclear safety.

European Commission efforts towards harmonisation (11)

Notes on nature of safety standards and verification of their fulfilment (cont.):

- It is not possible to write in retrospect common technical safety standards for existing nuclear power plants. Plants are different, and attempts to modify their design to meet common rules might result in degradation of overall safety level (in addition to being very costly).
- As opposite to the belief by the Commission, a systematic methodology was not developed for assessing the level of nuclear safety in the EU candidate countries. Therefore, a methodology that could be used in all EU member states after enlargement does not exist.

European Commission efforts towards harmonisation (12)

- The political request on high consistent safety level at all European NPP's is of course very valid, and the nuclear community must respond to it in an acceptable manner.
- Any solution has to be based on the current NSC, and the Commission has to find its role in that context.
- A meaningful approach could consist of
 - a Nuclear Safety Directive that provides a set of fundamental binding requirements on nuclear safety and its regulation
 - Commission supervision of the quality of work of the national Safety Authorities
 - a close co-operation between the national regulators

IAEA Safety Standards Programme (1)

First IAEA safety standards were issued in 1961.

Nuclear Safety Standards Programme was started in 1974

- documented existing practices in developed countries
- was mostly intended for use of developing countries
- requirements were formulated such that all countries could meet them
- was not considered useful by most advanced countries; therefore very limited contribution from them

IAEA Safety Standards Programme (2)

Current cycle of revision started in 1996

- revised standards are aimed to document best worldwide practices and to drive safety development forward
- systematic preparation process and clearly defined organisation for that are in place
- three levels of regulations are being issued: safety fundamentals, requirements, guides

IAEA Safety Standards Programme (3)

Policy discussion on IAEA Safety Standards was the main topic in Senior Regulators' Meeting in September 2002, in connection with the IAEA General Conference.

- Strong support for the programme in general: must be the only international set of safety regulations.
- In order to provide added value to the national regulations in developed countries, the IAEA Safety Standards must be ambitious and document the best worldwide practices.
- This includes a dilemma: no one can meet all requirements/guidelines because the level of ambition is increasing with time.

IAEA Safety Standards Programme (4)

IAEA has recognised a need for a “philosophical” document that explains the intent and ultimate goal of the standards.

There is a general support for a single safety fundamental publication that would contain the mandatory rules

- This document could be somewhat larger and more detailed than the current “safety fundamentals” document, or the Nuclear Safety Convention
 - appropriate parts from the current “requirements” documents could be included
- The new safety fundamentals publication could serve as the bases for binding national or regional (such as European) regulations.

European Utility Requirements (1)

EUR work is focused on design requirements of new plants.

- the objective is thus more limited than in other harmonisation efforts where design issues are only a small part of total work
- on the other hand, volume of work is very large and goes much deeper in technical issues than other harmonisation activities discussed in this presentation

The main aim is to make a standard plant designed in one country licensable in other countries.

European Utility Requirements (2)

The EUR work started in 1992 and has resulted in extensive documentation of the requirements. It includes both generic safety requirements and their application to most of the plants which are on market to day.

- The approach provides “qualification” of the generic requirements against real designs.
- The number of specific requirements included in the documentation is several thousands.

European Utility Requirements (3)

Development of technical safety requirements is very much industry driven, and goes hand in hand with new designs and development of the technology.

- Design work has been made in recent years only in France, Germany, and Sweden; the concrete proposals for requirements come mostly from those countries.
- Among the participating countries, Finland is exceptional because here we have also independent generic design requirements issued by the regulators.

WENRA work (1)

Driving forces for the WENRA work:

- Public expects higher level of nuclear safety and its verification in a transparent manner.
- Globalisation and deregulation of the electricity market require similar operating conditions in different countries.
- Regulators must ensure that increase of productivity is not obtained at the expense of safety.
- Political pressure for harmonisation within EU is evident, regulators must act on time to ensure that it is done in a professional way.

WENRA work (2)

Main objective is achievement of high and consistent level of nuclear safety at currently operating nuclear power plants

- no specific emphasis on possible new plants (difference from EUR)

Work started in 1999 by setting a Working Group to

- analyse the current situation: are there actual differences in the safety approaches and consequently differences in the safety level?
- explain the reasons for possible differences
- propose a way forward to possibly eliminate the differences without impairing the safety

WENRA work (3)

The Working Group developed a methodology and conducted a pilot project

- specified six issues from different areas: safety policy, operating organisation, verification and improvement of design, beyond design basis accident management, probabilistic safety assessment, and periodical safety review
- identified national requirements for those issues and also described the situation with respect to implementation
- agreed on [reference requirements](#) for each issue and compared them with respective IAEA safety standards
- made a collective judgement of the situation in each country:
 - are there formally issued national requirements that are consistent with the reference requirements?
 - is the actual implementation meeting reference requirements?

WENRA work (4)

An example of reference requirements for issue “Probabilistic Safety Assessment”

1. Scope and content of PSA

- 1.1 PSA shall be developed for levels 1 and 2
- 1.2 PSA shall include all modes of operation, all relevant initiating events and hazards, including internal fire, internal flooding, severe weather conditions and seismic events
- 1.3 PSA shall include all relevant dependencies (functional dependencies, area dependencies and other common cause failures)
 - PSA shall contain uncertainty and/or sensitivity analyses
 - PSA shall be based on a realistic modelling of plant response, taking into account human performance to the extent assumed in operating and accident procedures
 - Human errors shall be analysed, taking into account the factors which can influence the performance of the operators in all plant states

2. Quality of PSA

- PSA shall be performed, documented and maintained according to the quality management system of the licensee
- 2.2 PSA shall be performed according to the state- of- the-art methodology

3. Use of PSA

- 3.1 PSA shall be used for safety management purposes. Its role in the decision making process shall be defined.
- 3.2 PSA shall be used to identify the need for modifications to the plant and its procedures, in order to reduce the risk from the plant.
- 3.3 PSA shall be used to assess the overall risk from the plant, to demonstrate that a balanced design has been achieved, and to provide confidence that there are no "cliff edge effects"
 - PSA shall be used to assess the adequacy of plant modifications, changes to technical specifications and procedures and to assess the significance of operational occurrences
 - Insights from PSA shall be used as input to development and validation of the safety significant training programmes of the licensee, including simulator training of control room operators

WENRA work (5)

The WG proposes to extend the pilot project to cover 19 safety issues; these issues are considered to make an adequate comprehensive set.

- The extended project should provide final report in early 2005.

Work should be based on maximum utilisation of the IAEA nuclear safety standards in defining reference requirements.

All national regulatory bodies are asked to commit to meet the reference requirement by a date to be specified by WENRA.

WENRA work (6)

A comprehensive set of 19 safety issues, grouped in five areas, is as follows (those denoted with + are already done):

Safety Management

- Safety Policy (+)
- Operating Organisation (+)
- Quality Management System
- System for Training and Authorisation of plant staff with tasks important to safety

Design

- Verification and Improvement of design (+)
- Design Basis Envelope for existing PWR and BWR
- Safety Classification of systems, structures and components (SSC) and related requirements

Operation

- Operational Limits and Conditions
- Ageing Management
- Preventive and Corrective maintenance
- System for investigation of Events and Operational Experience Feed-back
- In-service Inspection, Functional Testing and Operability Control
- Emergency Operating Procedures
- Beyond Design Basis Accident Management (+)

Safety Verification

- Contents and Updating of SAR/safety case
- Probabilistic Safety Assessment (+)
- Periodic Safety Review (+)
- Assessment of plant modifications

Emergency Preparedness

- On-site emergency preparedness arrangements
- Fire fighting