

WENRA Safety Requirements for New and Existing NPPs: Complying with the Vienna Declaration on Nuclear Safety

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Dr. Hans Wanner, WENRA Chairman

Agenda

01. WENRA Basic Facts
02. Vienna Declaration on Nuclear Safety
03. WENRA Requirements for New NPPs
04. WENRA's Updated Safety Reference Levels for Existing Reactors
05. Summary

01

WENRA Basic Facts

01 WENRA Basic Facts

Origins

- Association of the Heads of nuclear regulatory authorities of the EU countries with nuclear power plants (NPPs), Switzerland and Ukraine
- Founded in 1999
- Assisted EU Commission in assessing nuclear safety in applicant countries

Policy Statement

- Commitment to **continuous improvement** of nuclear safety in member countries
- Develop a common, **harmonised approach** to nuclear safety
- Develop **common Safety Reference Levels** (SRLs) based on IAEA standards and good practices in member countries

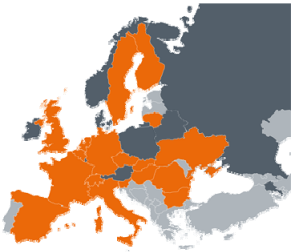
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01 WENRA Basic Facts Members and Observers

18 Members

- Belgium
- Bulgaria
- Czech Republic
- Finland
- France
- Germany
- Hungary
- Italy
- Lithuania
- Romania
- Slovak Republic
- Slovenia
- Spain
- Sweden
- Switzerland
- The Netherlands
- Ukraine
- United Kingdom



10 Observers

- Armenia
- Austria
- Belarus
- Canada
- Denmark
- Ireland
- Luxemburg
- Norway
- Poland
- Russian Federation

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01 WENRA Basic Facts Working Groups

- Technical Working Groups (WG) established to **harmonise safety approaches** with the aim to continuously improve nuclear safety:

RHWG Reactor Harmonisation Working Group

WGWG Working Group on Waste and Decommissioning

Ad-hoc Working Groups as needed

- These WG develop Safety Reference Levels (SRLs) and manage other projects for harmonisation of nuclear safety in Europe
- Objective of **Harmonisation**:

No substantial differences between countries in national safety requirements and in their implementation in the nuclear installations

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02

Vienna Declaration on Nuclear Safety

02 Vienna Declaration on Nuclear Safety Origin

- Switzerland submitted an **Amendment Proposal** to the Convention on Nuclear Safety in **2013**
- In **April 2014**, **2/3 of the CNS Contracting Parties** voted in favor to hold a Diplomatic Conference regarding the Amendment Proposal
- In **February 2015**, the CNS Contracting Parties **adopted the Vienna Declaration on Nuclear Safety** by consensus
- Vienna Declaration on Nuclear Safety is a consensus document, which forms integral part of the CNS
- Enshrines **Safety Principles for new and existing NPPs**, especially the principle of **continuous improvement**

02 Vienna Declaration on Nuclear Safety Safety Principles for new and existing NPPs

(1) "**New nuclear power plants** are to be designed, sited, and constructed, consistent with the objective of **preventing accidents** (...) and, should an accident occur (...) **avoiding early radioactive releases or radioactive releases large enough to require long-term protective measures and actions.**"

(2) "Comprehensive and systematic safety assessments are to be carried out periodically and regularly for **existing installations** throughout their lifetime in order to **identify safety improvements** that are oriented to **meet the above objective**. Reasonably practicable or achievable safety improvements are to be implemented in a **timely manner.**"




(3) "National requirements and regulations for addressing this objective (...) are to take into account relevant IAEA Safety Standards and, as appropriate, other good practices ..."

03

WENRA Requirements for New NPPs

03 WENRA Requirements for New NPPs Basis

- Work on the safety of new NPP designs initiated in 2008
- Review of national and international documentation showed consistency on the main lines of expected safety improvements:
 - Reinforce the defence-in-depth concept, each level and their independence
 - Extend the design, include severe accidents as a new level of defence
 - Reduce the necessity of off-site measures in case of accident
 - Consider safety issues in existing plants
 - Increase components and systems diversity
 - Increase protection against hazards
 - Better consider management of safety
- RHWG report in January 2010
- Stakeholder consultation through WENRA website

 **WENRA Statement on the Safety Objectives for new NPPs issued in November 2010**



03 WENRA Requirements for New NPPs Safety objectives for new NPPs

7 high-level (qualitative) safety objectives:

01. Normal operation, abnormal events and prevention of accidents
02. Accidents without core melt
03. Accidents with core melt
04. Independence between all levels of defence-in-depth
05. Safety and security interfaces
06. Radiation protection and waste management
07. Leadership and management for safety



03 WENRA Requirements for New NPPs Complying with the Vienna Declaration §(1)

WENRA Statement on Safety Objectives for New NPPs (2010)

Objective O2

WENRA expects new NPPs to be designed, sited, constructed, commissioned and operated with the objectives of:

- “ensuring that **accident without core melt** induce no off-site radiological impact or only minor radiological impact (in particular, no necessity of iodine prophylaxis, sheltering nor evacuation). ...”

03 WENRA Requirements for New NPPs Complying with the Vienna Declaration §(1)

WENRA Statement on Safety Objectives for New NPPs (2010)

Objective O3

WENRA expects new NPPs to be designed, sited, constructed, commissioned and operated with the objectives of:

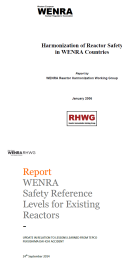
- “**accidents with core melt** which would lead to **early or large releases have to be practically eliminated;**
- for **accidents with core melt** that have not been practically eliminated, design provisions have to be taken so that **only limited protective measures in area and time are needed for the public** (no permanent relocation, no need for emergency evacuation outside the immediate vicinity of the plant, limited sheltering, no long term restrictions in food consumption) and that sufficient time is available to implement these measures.”

04

WENRA's Updated Safety Reference Levels (RLs) for Existing Reactors

04 WENRA's RLS Achievements

- 2006 : Complete set of Safety Reference Levels (RLs) for reactor safety is published
- January 2008 : Revised set of 295 RLs based on stakeholder comments and newly published IAEA publications
- September 2014 : Updated set of RLs taking into account lessons learned from Fukushima Dai-ichi accident
- RLS and related reports can be found at: www.wenra.org



04 WENRA's Updated RLS Input and process for the 2014 update

- IAEA work to revise its Safety Requirements (gap analysis)
- Conclusions of Second Extraordinary meeting on Convention on Nuclear Safety
- ENSREG recommendations and suggestions (EU stress tests)
- National requirements of WENRA member countries
- WENRA work performed on the safety of new reactors, on PSR
- RHWG work performed in sub-groups on
 - Natural Hazards
 - Containment integrity
 - Accident Management measures
- Draft revised set benefited from stakeholder comments (e.g. by ENISS, EC-JRC, UK Nuclear Institute)

04 WENRA's Updated RLS Main Changes

- Changes introduced to account explicitly:
 - Safety culture
 - Safety of spent fuel pools
 - Sites with multiple reactors
 - Conditions at the site after an accident
 - Need for independent and diverse heat removal means
 - Beyond design basis conditions, including margins
- A new "issue T" dedicated to Natural Hazards has been created
- In addition to RLS, guidelines for issue E/F (design basis envelope, design extension) and issue T

04 WENRA Updated RLs

Safety area	Issue	Number of RLs
Safety Management	A – Safety Policy	9
	B – Operating organization	15
	C – Management system	26
	D – Training and authorization of NPP staff	15
Design	E – Design basis envelope for existing reactors	46
	F – Design extension of existing reactors	25
	G – Safety classification of structures, systems and components	7
	T – Natural hazards	19
	H – Operational limits and conditions	19
Operation	I – Ageing management	8
	J – System for investigation of events and operational experience feedback	16
	K – Maintenance, in-service inspection and functional tests	20
	LM – Emergency operating procedures and severe accident management guidelines	20
	N – Contents and updating of safety analysis report	17
Safety verification	O – Probabilistic safety analysis	16
	P – Periodic safety review	9
Emergency preparedness	Q – Plant modifications	15
	R – On-site emergency preparedness	20
	S – Protection against internal fire	20

**overall,
342 RLs**

04 WENRA's Updated RLs

Complying with the Vienna Declaration §(1)

In Issue E (Design basis envelope): RL E1.1

- The design basis shall have as an objective the prevention or, if this fails, the mitigation of consequences resulting from anticipated operational occurrences and design basis accidents. Design provisions shall be made to **ensure that potential radiation doses to the public and the site personnel do not exceed prescribed limits and are as low as reasonably achievable.**



04 WENRA's Updated RLs

Complying with the Vienna Declaration §(1)

In Issue F (Design extension): RL F4.14

- In DEC A [no core melt], radioactive releases shall be minimised as far as reasonably practicable.
- In DEC B [core-melt], any radioactive release into the environment shall be limited in time and magnitude as far as reasonably practicable to:
 - (a) allow **sufficient time for protective actions** (if any) in the vicinity of the plant; and
 - (b) **avoid contamination of large areas** in the long term.



04 WENRA's Updated RLs

Complying with the Vienna Declaration §(2), §(3)

In Issue P (Periodic Safety Review) :

- Identification and evaluation of the safety significance of deviations from applicable current safety standards and internationally recognised good practices (RL P1.3)
- Identification and timely implementation of reasonably practicable improvement measures (RL P1.4)
- Comprehensive scope with regard to significant safety aspects (RL P2.2)
- Use of an up to date, systematic, and documented methodology (RL P3.1)



04 WENRA's Updated RLs

Complying with the Vienna Declaration §(2)

WENRA Statement on Safety Objectives for New NPPs (2010)
Use within a PSR

"The safety objectives address new civil NPP projects. However, these objectives should be used as a reference for identifying reasonably practicable safety improvements for "deferred plants" and existing plants during periodic safety reviews."

RL P1.3 .3 The review shall identify and evaluate the safety significance of deviations from applicable current safety standards and internationally recognised good practices taking in-to account operating experience, relevant research findings, and the current state of technology.

04 WENRA's Updated RLs

Commitment



"The national regulators make a commitment to improve and harmonize their national regulatory systems, by implementing the new SRLs until 2017 as a target date."

WENRA statement regarding the revision of the SRLs for existing reactors taking into account the lessons learned from the TEPCO Fukushima Dai-ichi Nuclear Accident (2014)

05

Summary

05 Summary

- WENRA issued
 - 7 high-level **safety objectives for new NPPs** (2010)
 - updated the set of **Safety Reference Levels for existing NPPs** (2014), to take into account Fukushima Daiichi lessons learned
- For new NPPs, **safety objectives (O2) and (O3)** correspond to the Vienna Declaration §(1)
- For existing NPPs, **Issue E, F and P** of the Safety Reference Levels address the Vienna Declaration §(1), §(2) and §(3)

Thank you.

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