

46th Annual Meeting on Nuclear Technology:

Key Topic | Outstanding Know-How & Sustainable Innovations

The following report summarises the presentations of the Focus Session “Implementing New Safety Requirements in Europe” presented at the AMNT, Berlin, 5 to 7 May 2015. The other Focus Sessions and Technical Sessions will be covered in further issues of atw.

Outstanding Know-How & Sustainable Innovations: Implementing New Safety Requirements in Europe

Christian Raetzke

The topical session “**Implementing New Safety Requirements in Europe**” was coordinated and chaired by Dr. Christian Raetzke (CONLAR Consulting on Nuclear Law and Regulation, Leipzig, Germany). The aim of the session was to explore the background and the consequences of the revision and implementation of enhanced safety requirements for new and existing nuclear power plants in Europe.

The revised requirements created in the last years, which mostly have been directly or indirectly prompted by the Fukushima accident in March 2011, have their origin in different international sources. In 2014, the EU issued the revision of its Directive on Nuclear Safety. The same year, WENRA – Western European Nuclear Regulators Association completed the revision of its Reference Levels which are now in the course of implementation. The IAEA – International Atomic Energy Agency, in its turn, is pursuing a number of post-Fukushima actions and programmes, including the revision of its safety standards. Each of these three international bodies was represented by a speaker. In Germany, the revision of the nuclear regulations (“Sicherheitsanforderungen”) was strongly linked to these international developments; a speaker from Gesellschaft für Anlagen- und Reaktorsicherheit – GRS shed light on this connection. Finally, it seemed imperative to also have a look on how the new safety requirements are taken into account by nuclear operators and by the designers of nuclear reactors. Accordingly, representatives of the Czech operator ČEZ and of Areva gave their views and explained how their companies have reacted to the new requirements and enhanced the safety of their nuclear power plants and their reactor designs.

As the first speaker, Massimo Garribba (Director Nuclear Safety and Fuel

Cycle of the DG Energy of the EU Commission) gave a presentation on **The Revised EU Nuclear Safety Directive**. As is well known, the Directive 2009/71/Euratom establishing a Community framework for the nuclear safety of nuclear installations was revised in 2014 (Directive 2014/87/Euratom) as part of the Commission’s post-Fukushima actions based on a mandate by the European Council. The revised Directive now contains a high-level Safety Objective which applies directly to new nuclear power plants and which is to be used as reference for “reasonably practicable” safety improvements to existing installations. Massimo Garribba acknowledged that the term “reasonably practicable” leaves room for interpretation and will likely cause intensive discussion in individual cases. However, as Dr. Garribba set forth, the most controversial issue of the Directive was the introduction of topical peer reviews which are obligatory every 6 years, starting at the latest in 2017, and result in the obligation of member states to take appropriate follow-up actions based on the findings of the reviews. As Dr. Garribba explained, this new system of topical peer reviews is intrinsically connected to the new safety objective and is destined to ensure its harmonious and coherent implementation through the nuclear installations in the EU.

Next, Dr. Hans Wannner (Director of the Swiss regulator ENSI – Eidgenössisches Nuklearsicherheitsinspektorat and Chairman of WENRA) took the floor with a presentation on **The Revision of WENRA Reference Levels and their Implementation by WENRA Regulators**. Dr. Wannner introduced the participants to the history and the work of WENRA and its Reference Levels for the harmonisation of nuclear safety in Europe, based on the fundamental aim that there should be no substantial differences between countries in national safety requirements and in their implementation in the nuclear installations. He sketched the revision of the Reference Levels after Fukushima, with a focus on Issue

E (design basis envelope) and Issue F (design extension) which were substantially revised and complemented with new dedicated guidance documents. Besides, a new Issue T (natural hazards) was added. Parallel to this, a new approach was taken to harmonise emergency preparedness and response in WENRA countries. Summarising these different improvements and revisions, Dr. Wannner explained the general approach taken by WENRA: it is the notion of continuous improvement as major element of safety culture.

Gustavo Caruso (Special Coordinator, Nuclear Safety Action Team, IAEA) presented the **IAEA Activities Concerning Nuclear Safety After the Fukushima Accident**. These activities are defined in the IAEA Action Plan adopted in 2011. The Action Plan encompasses 12 issues such as undertaking safety assessment, strengthening the role of IAEA peer reviews, enhancing emergency preparedness and response, strengthening the effectiveness of national regulatory bodies and revising the IAEA safety standards. For each of these 12 topics, Mr Caruso presented an impressive array of actions and programmes undertaken or coordinated by the Agency. As Mr Caruso demonstrated, the Action Plan with its many facets has substantially contributed to improving nuclear safety after Fukushima. At the same time, he noted that some issues remain, such as the fact that not all action points have been fully implemented by all members (e.g. the recommendation to host an OSART mission every 3 years). Besides, the question now was how to avoid losing momentum. He also acknowledged that the Agency itself has learned lessons from Fukushima: it is important that it becomes more efficient and effective in its activities. Finally, Mr Caruso strongly recommended to the participants the upcoming major IAEA report on Fukushima which will be published for the 59th IAEA General Conference in September.

On the basis of lively question and answer sessions after each of the

presentations and due to the fact that the three international speakers made reference to each other, there emerged a general picture of the **different mechanisms how the three international bodies implement their enhanced safety provisions**. The IAEA mainly gives recommendations and advice, and provides services, to its members. The Convention on Nuclear Safety, which the IAEA administers, follows an ‘incentive’ concept: it is legally binding but strictly speaking there is no enforcement mechanism; implementation is mainly based on peer pressure at the three-yearly review meetings. All three speakers mentioned the ‘Vienna Declaration’ of February 2015, which is the outcome of a diplomatic conference to revise the Convention on Nuclear Safety; the conference resulted in the decision not to introduce safety objectives into the convention itself, but instead to publish them as principles in a separate ‘Declaration’. This was seen as a step forward but it has also highlighted the difficulties of finding an international consensus. By contrast, the EU Directive, including its new Safety Objective, is by nature not merely ‘incentive’, as *Massimo Garribba* pointed out; it creates a legal obligation and is enforceable based on the *Euratom* Treaty. For *WENRA*, *Dr. Wanner* stressed the joint commitment of the participating regulators as the basis for new requirements. When asked how the notion of ‘commitment’ related to ‘incentive’ (IAEA) vs. ‘obligation and enforcement’ (EU), *Dr. Wanner* replied that in his view ‘commitment’ is more than both: it is a cultural issue and relies on shared convictions and not merely on the obligation to comply with requirements.

As next speaker, *Dr. Kay Nünighoff* (Head, *Nuclear Technology Guidelines, Reactor Safety Analyses Division, GRS*) gave the German ‘answer’ to these international developments by talking about **The Revision of the German Regulations in the Light of Developments in the EU and Worldwide**. *Dr. Nünighoff* explained that he would concentrate not on details but on the fundamental approach. As he set forth, section 7 no. 3 of the German Nuclear Energy Act establishes the requirement that the necessary precautions against damage have been taken in the light of the state of the art in science and technology. This results in an obligation of the German federal regulator (*BMUB*) to continuously monitor the international state of the art, also in regulations. Besides, *Dr. Nünighoff* pointed out that recurrent review of regulations and guidelines is also required in international standards such as the IAEA’s GSR Part 1

“Governmental, Legal and Regulatory Framework for Safety”. The role of *GRS* is to support *BMUB* by analysing new information with respect to national regulations and identifying any need to revise German regulations. *Dr. Nünighoff* then gave an overview of the international sources new requirements may come from and which *GRS* continuously monitors, the most important having been addressed in the previous presentations: IAEA, *WENRA* and generally lessons learned from *Fukushima*. In the ensuing discussion, *Dr. Nünighoff* was asked whether the new German regulations would result in changes to German nuclear power plants. He cautioned that the implementation in the nuclear power plants was not in the focus of his presentation and of his work at *GRS*; however, he gave his personal expectation that considering all the backfitting done in German installations e.g. after *TMI*, *Chernobyl* and the post-*Fukushima* national action plan, probably no need for additional substantial changes would be identified.

Next, *Milan Šykora* (Production Division Project Manager, *ČEZ*), gave an overview of **The Impact of New Safety requirements on the Operation of Existing Installations in the Czech Republic**. Mr *Šykora* explained that *ČEZ*, which operates the two multi-unit nuclear power plants in the Czech Republic, had been confronted with new requirements coming from various sources: the post-*Fukushima* stress tests resulting in identification of areas and potentials for improvement, the revised EU Nuclear Safety Directive 2014 with its Safety Objective, the new *WENRA* reference levels and the enhanced IAEA safety standards putting a particular focus on strengthening the concept of defence-in-depth. As Mr *Šykora* explained, the main challenge was to apply requirements created for Gen III plants to the existing Gen II installations, the yardstick being that they should be ‘reasonably practicable’ (as set forth in the Directive). On this basis, *ČEZ* developed a plan allocating measures and actions to each of the five levels of the defence-in-depth concept. A special focus was given to design extension conditions, accident management and emergency response. *Milan Šykora* gave some examples such as in-vessel retention (with outside reactor pressure vessel cooling) or the provision of diverse alternate (mobile) means. In the question and answer session after his presentation, he gave additional explanations about implementing measures.

As final speaker, *Dr. Ulrich Klapp* (Licensing Manager for the *Olkiluoto 3* Project, *Areva*, Erlangen), in a present-

ation co-authored with *Jürgen Wirkner* (Senior Advisor EPR Technology, *Areva*), focused on **The Impact of New Safety Requirements on the Design of New NPP in the EU on the Example of EPR**. The point of departure of *Dr. Klapp’s* presentation was that safety requirements are mostly country-specific but that the work of institutions such as *WENRA* has resulted in a high degree of harmonisation especially in post-*Fukushima* requirements. *Areva’s* EPR was designed to fulfil these safety requirements. *Dr. Klapp* illustrated this by focusing on 7 topical areas. The first and fundamental of these was the Defence-in-Depth (DiD) approach for new nuclear power plants; here, *Dr. Klapp* explained the EPR’s philosophy translating the concept into the levels “normal operation”, “preventive line of defence”, “main line of defence”, “risk reduction line” and “severe accidents”. He concluded that the DiD approach was fully implemented in the EPR. The other topical areas (based on the *WENRA* reference levels) for which *Dr. Klapp* highlighted some EPR features were: independence of the levels of Defence-in-Depth; multiple failure events; provisions to mitigate core melt and radiological consequences; practical elimination of accidents with core melt which would lead to early or large releases; external hazards; and finally the intentional crash of a commercial airplane. In all these areas, *Dr. Klapp* concluded that the EPR design fulfils all requirements. He gave additional explanations on technical features in response to questions from the audience.

There was unfortunately no time for a final round of discussion. However, the author hopes that nevertheless the main aim of the session was reached: to give a high-level, comprehensive and lively overview of the different international sources for new safety requirements, of monitoring and implementation by German authorities (as an example of a national regulator) and finally of the measures taken by operators and designers to implement these new requirements, both for existing installations (where the yardstick of ‘reasonably practicable’ improvements has to be observed) and for new designs. At the end of the session, there was a strong final applause for the excellent speakers.

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