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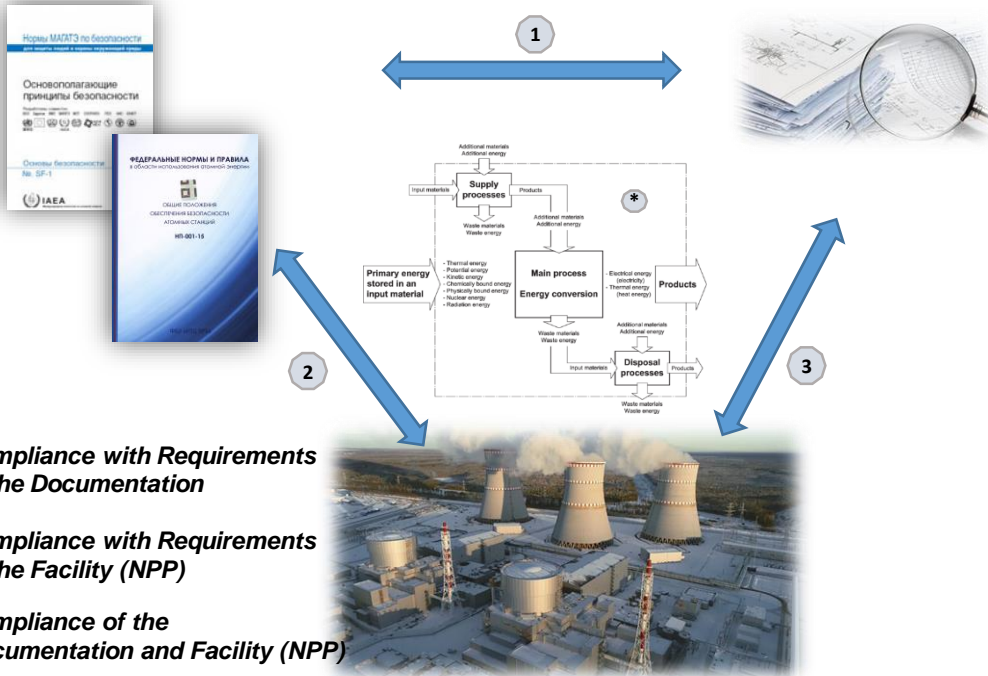
Russian industry benefits from MDEP and VVER WG activities and expected prospects of further cooperation

5th MDEP Conference "International Cooperation, Past, Present and Future"

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Practical benefits of the MDEP experience in achieving success criteria of the NPP construction projects



- 1 **Compliance with Requirements in the Documentation**
- 2 **Compliance with Requirements in the Facility (NPP)**
- 3 **Compliance of the Documentation and Facility (NPP)**

Examples:

- ✓ Provisions of the **common position** of CP-VVERWG-02: “Addressing ex-vessel corium stabilization in core catcher” (slide 3) were used in reviewing the safety justification and were reflected in the comments set out in the review conducted by FSUE SEC NRS (Scientific and Engineering Center for Nuclear and Radiation Safety) in the framework of licensing the VVER-1200 pilot projects (Units 1 and 2 of LNPP-2, Units 1 and 2 of Novovoronezh NPP-2). Based on the above-mentioned comments, the license validity terms were formulated, and the Operator carried out additional safety justifications.
- ✓ Provisions of the **common position** of CP-VVERWG-01: “Addressing Fukushima-related issues” (slide 3) are used in the safety review of the Units under construction and in operation, in particular, in reviewing the justification of protection, against external hazards, of the mobile equipment applied at Russian NPPs as DEC management features.

* Notation of ISO 81346-2015 Part 10 . NPP processes

Elaboration of common position by VVERWG in reviewing project-based cases allows the **Compliance Equilibrium** to be reliably maintained

Results of WG VVER activities in the practical aspect of NPP designing (1/2)



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Common positions:

1. CP-VVERWG-01: Addressing Fukushima-related issues, May 2017. The common position contains a description of the general approach to the safety assessment of VVER-based NPP designs, taking into account the lessons learned from the Fukushima Daiichi accident.
2. CP-VVERWG-02: Addressing ex-vessel corium stabilization in core catcher, June 2021. The common position was formulated based on a preliminary developed report “Core Catcher” (“fuel catcher”, or “melt retention device”, according to the terminology adopted in the design), dedicated to the technical features of the core catcher design and its operation conditions.
3. CP-VVERWG-03: Reactor pressure vessel and primary components reliability for AES-2006 designs, October 2021. Test programs for surveillance samples to justify the reactor pressure vessel integrity, Qualification of First-of-a-Kind equipment components, Qualification of welders and non-destructive testing procedures (processes).

Results of WG VVER activities in the practical aspect of NPP designing (2/2)

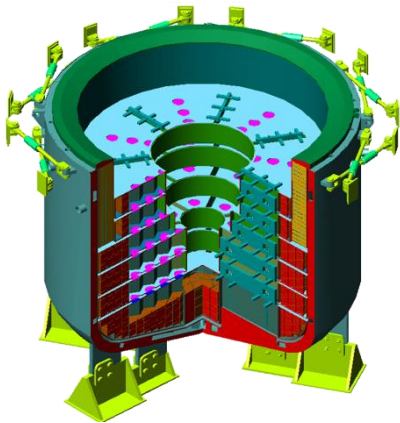


Technical reports and their subject areas allowed the developers to be focused on the following:

1. TR-VVERWG-01: Regulatory approaches and criteria used in severe accident analyses and severe accident management, November 2017 VICWG-02 (replaces this technical report). The results of a **comparative analysis of the requirements of national regulatory authorities**, which shall be met by the designs of innovative VVER-based NPPs **with regard to severe design extension conditions**.
2. TR-VVERWG-02: Regulatory approaches and oversight practices related to reactor pressure vessel and primary components, May 2017. Results of a **comparative analysis of national requirements** for: design of primary circuit equipment (taking into account loads and their combinations); accounting for the influence of nickel and manganese content in the reactor pressure vessel material on the RPV radiation embrittlement; cladding of equipment and pipelines of the primary circuit; manufacturing of primary circuit equipment; pre- and in-service inspection of primary circuit components (including hydrostatic pressure tests); application of the “leak before break” concept.
3. TR-VVERWG-03: Regulatory approaches related to accidents and transients analyses, March 2019. Review of regulatory requirements and existing practice in the field of analyzing accidents and transients in Russia, Hungary, Turkey, China and Finland.

Results of WG VVER activities: the possibility of a detailed presentation of important features of implementing the technology of VVER-based NPPs

TR-VVERWG-04: Core Catcher, June 2021. The need to develop this technical report was due to the fact that the representatives of the participating countries were not familiar to a sufficient detail with the technical features and characteristics of the core melt retention device design



Through a systematic presentation of a design solution to its practical implementation at NPPs. Photo on the right shows the installation of the core catcher body at the AKKUYU NPP Unit 3 (Republic of Turkey)

Promising areas of cooperation



1. Exchange of best practices in conducting an expert review of the safety justification of NPPs with VVER-1200 reactors;
2. Exchange of best practices in construction, start-up and adjustment, commissioning and the first years of operation – as part of this area, the participating countries exchange their experience on incidents occurring at the sites of VVER-based NPPs;
3. Issues related to the qualification of the “supplier chain” participants in the nuclear industry;
4. Finalization of technical reports on long-term heat removal from the containment;
5. Establishment of an expert subgroup on probabilistic safety assessment;
6. Further **enhancement of interaction with industry, including the creation of a mechanism for preparation of questions from representatives of Russian design offices and Operators to representatives of regulatory authorities of countries constructing nuclear power plants according to Russian designs**;
7. Completion of the development of a common position on the Vienna Declaration on Nuclear Safety in terms of preventing accidents leading to early and/ or large radioactive releases, as well as providing information on the measures provided at NPP Units to prevent releases during severe beyond design accidents.

