

EIA NPP KHMELNITSKY 3&4 PROCEDURE 2019

Vienna, 2019

Items

- 2 Incidents and accidents without involvement of third parties³
- 3 Incidents and accidents with involvement of third parties
- 5 Overall and procedural aspects of the EIA (q 1-3)

- **2 Incidents and accidents without involvement of third parties**
- *1 Which of the design features and additional prevention and mitigation measures for severe accident management of the Kozloduy NPP (JPEE 2018) have to be applied for KhNPP-3&4 (see table 1)?*
- **Demonstration of practical elimination**
- Analysis of the upgrades related to the prevention and mitigation of the beyond design basis and severe accidents showed that all the upgrades listed in the table will be implemented at KhNPP Power Units 3 and 4 after as soon as they are justified in SAR at the licensing stage
- *2 Have all of the recommendations by the ENSREG peer review team listed in the Country Report of the EU stress tests to further improve the SAM be considered for KhNPP-3&4?*
- All ENSREG peer review team recommendations listed in the Country Report of the EU stress tests will be taking into account at the stage of licensing in design of the units 3,4 at KhNPP

- **2 Incidents and accidents without involvement of third parties**

3 Which measures of the "Comprehensive (Integrated) Safety Improvement Program for Ukrainian NPPs (C(I)SIP) have to be implemented for KhNPP-3&4? Which of the measures are not necessary because of design improvements of the VVER-1000/V-320 for KhNPP-3&4?

- All Safety Improvement Program activities are taken into account; it is expected that the decision on the feasibility of their implementation will be taken at the design stage.

4 Which requirements have the filtered venting systems to fulfill, particularly regarding earthquake resistance?

- From the safety perspective, this system should be referred to systems important to safety.
- As to seismic classification, this equipment should be assigned the first category of seismic resistance (capacity) according to NP 306.2.208.2015, in other words, the equipment that will keep retain the operation capability in case of the maximum design earthquake (or SSE)

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5 What is the time schedule for the implementation of all required SAM features, and has the implementation of all SAM features including the ex-vessel cooling to be finished before commissioning KhNPP-3&4?

- The external cooling of the reactor vessel will be designed at the stage of licensing and implemented before the commissioning of the KhNPP-3 and 4 units. This also applies to all beyond-design-basis and severe accident management systems that are included in the feasibility study

6 Which initiating events (external and internal) will be considered for the accident analyses?

- A complete list of analyzed source events during the anticipated operational occurrences, design accidents, beyond design basis accidents and technogenic accidents will be included in the project applying the combined deterministic and probabilistic approaches in accordance with the national legislation requirements and IAEA recommendations at the stage of Design

7 Is the KhNPP site today in compliance with current IAEA requirements?

- The KhNPP site was originally designed to accommodate 4 power units. This site fully complies with all international requirements as evidenced by the positive results of the IAEA Project Safety mission as well as the results of stress tests developed according to WENRA requirements.

• **2 Incidents and accidents without involvement of third parties**

8 Please provide more details regarding the calculation of the seismic hazard. When will the seismic PSA for KhNPP-3&4 be developed? What are the results of the seismic PSA for KhNPP 1&2?

- Seismic PSA will be developed for Units 3 and 4 at the stage of design licensing in the scope of preliminary SAR
- Regarding Units 1,2: At present, in accordance with TP0.OB.1678.TP-OZ_20.02.2019_2-13283 "On the procedure for assessing the seismic resistance of equipment, pipelines, buildings and structures of KhNPP power units No. 1 and 2" the following can be highlighted:
- The seismicity of the KhNPP power unit No. 1 and No. 2 construction site was initially determined by microseismic zoning, taking into account the subgrading and groundwater levels. The seismicity of the site is estimated to match 5 points for the design-basis earthquake and 6 points for the maximum design earthquake (or SSE).
- In 1998-2001, the institute KIIZI "Energoprojekt" and Institute of Geophysics of the National Academy of Sciences of Ukraine carried out the additional instrumental research of the seismic hazards around the KhNPP site. The results of this work was included in the Technical Report on the Results of the Seismic Hazards Survey; it confirmed the seismic hazard assessment for the KhNPP site (5 points for DBE, and 6 points for SSE), which was adopted in the design. The studies performed to obtain the calculated accelerogram showed that the peak acceleration at ground level in the horizontal direction (PGA) does not exceed 0.08g.
- According to the IAEA recommendations (SSG-9), the PGA under the SSE, regardless of the initial earthquake resistance of the NPP site, should not be lower than 0.1 g.
- Taking into account the results of the additional 1998-2001 investigation of the KhNPP site as well as the IAEA recommendations on the minimum PGA level and seismic stability margin, the PGA level for the SSE is sufficient for the KhNPP site and takes into account the 25% PGA margin = 0.08g. PGA = 0.1g level was accepted by the SNRCU as acceptable for the KhNPP site.
- At present, to clarify the seismic characteristics of the KhNPP site as part of the Safety Enhancement Program activity No.18102 "Implementation of seismological monitoring systems for NPP sites" it is planned to build in the area of the KhNPP site a network of seismological observation points. Based on the results of the observations, refined DBE and SSE levels and characteristics for the KhNPP site will be obtained (in accordance with the deadlines for the implementation of the Safety Enhancement Program activity №18102; according to the Safety Enhancement Program schedule, this work should be completed before the end of 2021).

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9 Please provide more information about the protection measures against tornadoes and time schedule for implementation

- All structures take into account the effects of tornadoes. For the so-called sprinkling pools in all power units, the measures to prevent the coolant from being carried away from the surface have been taken, and Bubbler Tank is supposed to be fed from mobile pumping units

10 What are the parameters of the maximum aircraft crash (plane mass and speed) the buildings of the KhNPP-3&4 can withstand? Regarding external explosions, what are the maximum shockwave overpressures the buildings can withstand?

- The typical design considers the fall of a SESNA type light aircraft as an initial impact. It showed the absence of vulnerability of building structures with respect to this impact.
- In addition, at this stage, it has been proven that the risk from external extreme impacts associated with the fall of aircraft on buildings and structures of the unit is negligible (2×10^{-8} 1/per year) as opposed to the risk from internal initiating events. Therefore, it was decided to ignore the loads from impacts from a dropping passenger aircraft in the reactor compartment calculations.
- *External explosion*
- The civil structures of the reactor compartment and the backup diesel power plants have been designed, taking into account the loads produced by the impact of the air-shock wave with the following parameters:
- Overpressure at the shock wave front $\Delta P_{\phi} = 30$ kPa;
- Duration of the compression phase $\tau_{+} = 1$ s,
- which is an order of magnitude higher than the parameters of a possible air-shock wave at the border of the industrial site

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11 Why is the condition of SNRIU (2012b) to include an in-depth assessment of the impact of extreme external events of natural and man-made nature as well as their combination in the Preliminary Safety Report not included in the conditions for the approval of the current FS by SNRIU (2017)?

- FS does not contain PSAR. All requirements of the regulator will be implemented and shown at the stage of design and PSAR

- **3 Incidents and accidents with involvement of third parties**

1 What are the requirements with respect to the planned NPP design against the deliberate crash of a commercial aircraft?

- There are no such requirements in the national legislation.
- From the point of view of accounting this initial event in the PSA, all initial events are considered with a probability of more than $10E-7$. The probability of an initial event with the fall of the aircraft is $2E-8$

2 Is the protection of KhNPP-3&4 against the crash of a commercial aircraft required by the Ukrainian regulation? Or is such a requirement provided for?

- There is no such requirement in the national regulations

3 Have the recommendations of WENRA 2013 (Position 7: Intentional crash of a commercial airplane) been or will they be fully incorporated into the Ukrainian regulations?

- These requirements can be implemented and taken into account only if the new power units are constructed.

4 Have the requirements with respect to the protection against cyberattacks and insiders improved since the survey of the Nuclear Security Index 2018 or is such an increase/update of the requirements planned?

- At present, a specialized document on protection against cyber attacks is being developed and is expected to be officially issued before 2020.

- **3 Incidents and accidents with involvement of third parties**

5 Against which external attacks must the reactor building, and other safety relevant buildings be designed, especially the already completed building (back-up diesel generator of unit 3)? Is this protection still guaranteed despite adverse ageing effects? On the basis of which studies and conducted in which years can such a statement be made or will it be made in the future?

- The list of design impacts for the unit is given in the Reactor section. It is indeed guaranteed. Inspection of building structures is scheduled for 2019. The inspection scope includes all existing structures.

6 Is a peer-review mission of the IAEA International Physical Protection Advisory Service (IPPAS) planned before commissioning of KhNPP-3&4?

- Certainly, NAEC Energoatom will be grateful if such mission is carried out before commissioning of the KNPP power units 3 and 4

• **4 Overall and procedural aspects of the environmental impact assessment**

1 What information is included in the EIA documents that were published in Ukraine for public participation but were not submitted to Austria?

The EIA report was revised in 2016 to account for the new modification of the VVER-1000 reactor using data from a European manufacturer. Therefore, the list of beyond-design-basis accidents management systems and other related information was changed

2 When will the promised parts of the Preliminary Safety Report be submitted to Austria?

- A preliminary SAR is developed at the stage of licensing the power unit design. At this stage, all procedural issues should be implemented and the Law of Ukraine on the location of two new nuclear facilities should be adopted. After that, the power unit design will be developed taking into account all modifications and improvements made in the feasibility study.

3 What is the timetable for the next steps of the EIA procedure?

- EIA Report had been developed in the scope of FS in 2011 and updated in 2016.
- According to Ukrainian legislation the final decision for the completion of units' construction have to be approved by Parliament of Ukraine in corresponding Law.
- Thus, our legislation envisage three stages of design (FS, basic design, design) we have to develop update of EIA at the stage of design