



**Assessment of environmental impact
caused by planned activity
“Construction of Power Units № 3, 4 at Khmelnytsky NPP”**

2019

«Environmental Impact Assessment» (EIA) for the enterprise – Separate Subdivision “KHMELNITSKY NPP” of the STATE ENTERPRISE “NATIONAL NUCLEAR ENERGY GENERATING COMPANY “ENERGOATOM” is developed in accordance with requirements set in Article 6, item 2 of the Law of Ukraine “On Environmental Impact Assessment” № 2059-VIII dated 23.05.2017 with the observance of ecological, sanitary-hygienic, fire-prevention, urban-building and territorial restrictions in compliance with regulatory documents in force.

EIA is developed by:

The Main Developer

- JOINT STOCK COMPANY “KYIV RESEARCH AND DESIGN INSTITUTE “ENERGOPROJECT” (JSC KIEP)

Subcontractor

- LIMITED LIABILITY COMPANY “SCIENTIFIC ENTERPRISE “EXPERT CENTER” (SE “EXPERT CENTER”)

1. Description and objectives of the planned activity

1.1 *Description of the planned activity*

According to the current requirements of the Law of Ukraine “On Environmental Impact Assessment”, the EIA shall be mandatory performed while making decisions on implementation of the planned activity.

According to Article 3, item 2, part 2 of the Law of Ukraine “On Environmental Impact Assessment”, the design object – “Construction of Power Units № 3, 4 at Khmelnytsky NPP” – refers to Category I of such planned activities and objects which may significantly influence the environment and subjected to Environmental Impact Assessment.

1.2 *Objectives of the planned activity*

Objective of the planned activity is construction of Power Units № 3, 4 at Khmelnytsky NPP.

In accordance with Ukrainian Legislation, the decision on implementation of this planned activity will be accepted once the Verkhovna Rada of Ukraine adopts the Law of Ukraine “On Placement, Design and Construction of Power Units № 3, 4 at Khmelnytsky NPP”.

2. Assessment of the main types of impacts

2.1 *Atmospheric air*

The main types of environmental air impact caused by Khmel'nitsky NPP are as follows:

- Radioactive gaseous releases from KhNPP ventilation system;
- Non-radioactive releases from the chimney stack of the auxiliary boiler-house..

Influence on radiation situation caused by releases of radioactive substances from Khmel'nitsky NPP considering the background due to the global fallouts was not detected in the area of Khmel'nitsky NPP for the entire operation period. This conclusion can be proved with the results of environmental objects sampling.

During the entire period of KhNPP operation the absolute value of the dose rates on the territory of the control points does not depend on the control points location with respect to Khmel'nitsky NPP but it depends on natural radiation background and fallouts of radionuclides of the global origin.

Based on the performed estimates, it can be concluded that commissioning of Power Units № 3, 4 will not significantly change the radiation situation both on the territory of Khmel'nitsky NPP and in Monitoring Area.

Commissioning of Power Units № 3, 4 at Khmel'nitsky NPP will not result in new technological processes associated with release of harmful substances different from the existing substances into the atmosphere, that is, it will not change qualitative characteristics of the releases.

Values of near-surface concentrations of harmful substances per each ingredient outcoming from KhNPP sources are permissible for settlements and not exceeded on the boundary and beyond Sanitary-Protective Zone.

2.2 *Aqueous medium*

Infiltration of industrial water which occurred during operation of Power Units № 1, 2 at Khmelnytsky NPP caused changes in the groundwater regime on the territory of the industrial site.

As a result, a quite stable temperature and groundwater mineralization increase for a certain period of time is recorded in some areas. Nevertheless, this is a local phenomenon which occurs solely within industrial site and does not affect water intakes made while domestic and drinking water supply.

Accident-free operation of Khmelnytsky NPP, including Power Units № 1-4 will not make any influence on the state of underground water in Monitoring Area.

Quality (chemical and bacteriological composition) of the water intakes made while centralized domestic and drinking water supply in Khmelnytsky NPP Monitoring Area does not depend on NPP operation.

2.3 *Soils*

Almost all influence of Khmelnytsky NPP on the geological environment within industrial site and Khmelnytsky NPP took place during construction and commissioning of the facilities belonging to the complex of Power Unit № 1, and it should be kept in mind that most of these facilities also belong to the complex of Power Units № 3, 4 (cooling reservoir, inlet and outlet channels, block pumping stations, housing construction in Netishyn city, etc.).

The range of measures aimed to prevent or limit any possible KhNPP influence on the geological environment is considered to be effective one. Further development of exogenous geological processes is not expected.

2.4 *Flora and fauna*

Operation of two additional power units in general will not affect the structure and dynamics of plant species and will not change the number of populations of rare and Red Book plants. At current mainly radionuclides of natural origin can be detected in Khmelnytsky NPP area.

Commissioning of Power Units № 3, 4 and accident-free operation of Khmelnytsky NPP, including Power Units № 1-4 will not adversely affect the general species diversity of invertebrates and insects. Some changes will occur in water entomocomplex of cooling water reservoir. At the same time, it is determined that commissioning and normal mode of operation of KhNPP Power Units № 3, 4 will not adversely affect the fauna in KhNPP Monitoring Area. Deterioration of feed base, shelters, breeding grounds and animal migration routes is not expected.

2.5 *Monuments of architecture, history and culture*

Construction of Khmelnytsky NPP Power Units № 3, 4 will not result in damage of cultural heritage sources, because they are located beyond the territory selected for Khmelnytsky NPP industrial site.

3. Analysis of emergency situations

Results of the performed analysis demonstrated that such countermeasures as shelter and evacuation are not required in case of any design-basis accident beyond Sanitary-Protective Zone or design-basis accident which may occur on more distant territories.

In case of considered design-basis accidents, the evacuation beyond Sanitary-Protective Zone is not required, and no shelter is required starting from 5-km distance from power unit.

In case of the maximum design-basis accident and beyond-design-basis accidents accounted during the first year after the accident, the radioactive contamination of agricultural products may exceed the minimum permissible levels thereby prohibiting the consumption of local agricultural products at 30-km distance from the emergency power unit. Starting from the second year, the limitation imposed on consumption of local food products is not feasible.

Taking into account the dose values obtained under conditions of the considered accidents, it can be concluded that there is no necessity to extend the Sanitary-Protective Zone and Khmelnytsky NPP Monitoring Area while Power Units № 3, 4 commissioning.

4. Transboundary impact on the territory of Europe

To calculate the radiation impact on the territory of Europe were selected typical meteorological conditions, in which there may be an intensive transboundary withdrawal of activity in Europe.

The selected meteorological scenario describes weather conditions with high turbulence in the daytime boundary layer of the atmosphere (data of the radiosondance of the atmosphere during May 6-9). The eastern weak wind (from 2 to 5 m/s in a layer to 1 km) during the propagation of hypothetical emissions changes to the south-east and then to the northeast. It was supposed that at the time when the radioactive release reaches the territory of Europe, on the territory of its territory begins to fall rainfall at an intensity of 5 mm / h. The duration of precipitation was set at four o'clock. For this meteorological scenario, it was assumed that the region of atmospheric precipitation of such intensity exists on the territory of Europe directly abroad of Ukraine during the period of radioactive release there from the KhNPP, that is, at the time when the activity reaches the territory of Europe. In this scenario, atmospheric precipitation is absent throughout the territory of Ukraine, which provides the highest value of the density of falls in the territory of Europe under a given emission scenario.

As the criterion was taken the limit of the individual effective dose in all ways of exposure, set at 1 mSv / year.

Effective doses are derived from such irradiation of paths: inhalation, external irradiation from the radioactive cloud, external radiation from radionuclides settled on the ground and internal radiation from radionuclides coming from food. As a reference group of the population, rural residents who consume mainly foodstuffs of their own are selected.

Dosage evaluation is performed for two age groups - adults and children 1-2 years.

Maximum doses of irradiation are realized at the selected design accident, and their estimated values were 0.177 mSv/year for adults and 0.683 mSv/year for children.

The main way of dose formation is the food chain. It forms about 99 % of the dose. The main dose-forming radionuclide is ^{131}I .

Conclusions

Based on the Assessment of Environmental Impact caused by planned activity “Construction of Power Units № 3, 4 at Khmelnytsky NPP” we have obtained the conclusions regarding feasibility and possibility to implement the planned construction and operation activities. Significant environmental aspects of the planned activity, the forecast of the consequences for the environmental components and the accepted environment-oriented design solutions are considered in the obtained conclusions.

Conditions and requirements to the design solutions identified in course of Environmental Impact Assessment became the basis for the formation of environmental measures, the implementation of which will ensure the admissibility of impact and exclude negative unacceptable consequences for the natural environment and society.

Thank you for attention!