

**Statement on ecological consequences of the planned activities under Project
“Reconstruction of ChNPP Stage II (Power Units 3,4) Main Building with Reinforcement
and Sealing of structures, which perform NSC enclosing perimeter functions”**

1. Data on planned activities, purposes and ways of implementation

Construction of a New Safe Confinement (NSC) is the main preparation stage for conversion of Shelter Object into an ecologically safe system.

In accordance with the provisions of the Law of Ukraine “On General Provisions for ChNPP Further Operation and Decommissioning and Transformation of the Destroyed Unit 4 to an Environmentally Safe System» the NSC facility shall assure achievement of the following:

- Personnel, public and environmental protection from the impacts of nuclear and radiation hazard sources associated with Object Shelter;
- Arrangement of conditions to practically implement Object Shelter conversion into an ecologically safe system, in particular, retrieve remaining nuclear fuel and fuel-containing materials, complete deconstruction/reinforcement of Object Shelter unstable structures and provide radioactive waste management.

NSC facility includes two main components:

- NSC Arch with infrastructure being erected aside from OS, followed by Arch sliding into its design position;
- Existing and newly erected ChNPP Stage II structures functioning as NSC enclosing perimeter (EP).

The NSC Arch (NSC structure subject to sliding) includes: completely mantled dome-type part of the Arch and mounted east and west end walls, the lower edges of which iterate the boundaries of the existing ChNPP Stage II facilities, as well as the boundaries of the NSC Technological Building and Auxiliary facilities.

Currently the NSC Arch is being constructed by Joint Venture “NOVARKA” (France) with involvement of foreign and Ukrainian subcontractors.

NSC EP includes the existing and newly erected ChNPP Stage II structures located within the Turbine Hall, Deaerator Stack, Unit V and ASRU..

Working Design “Reconstruction of ChNPP Stage II (Power Units 3,4) Main Building with Reinforcement and Sealing of structures, which perform NSC enclosing perimeter functions” was developed by Consortium KSK consisting of Ukrainian organizations: Kiev Institute “Energoproekt” (PJSC KIEP), the State Enterprise “State Scientific-Research Institute of Building Constructions” (SE NIISK) and Institute for Safety Problems of Nuclear Power Plants of the National Academy of Sciences of Ukraine (ISP of NPP).

The principle function of NSC EP is to prevent spreading of radioactive materials and ionizing irradiation outside of NSC under normal operation, normal operation failures, accidental situations and accidents. This function shall be supported by the NSC EP structures integrity during 100 years under all types of impacts subject to consideration, including the extreme impacts.

2. Source and type of potential environmental impacts

Activities on reconstruction of ChNPP Stage II (Power Units 3,4) Main Building with reinforcement and sealing of structures, which perform NSC enclosing perimeter functions can provide environmental impact under normal conditions of works performance, and in case of implementation of various scenarios of potential accidents.

The main sources of potential environmental impacts during NSC EP construction activities are radioactively contaminated structures, equipment, other materials located within the work production areas. The planned activities will be performed in parallel with:

- Release of radioactivity;
- Generation of secondary radioactive waste.

Environmental radioactive impact under normal work performance conditions and in case of implementation of various scenarios of potential accidents inside Unit V rooms, ASRU and Deaerator Stack will be stipulated by gas-aerosol release through a new ventilation stack (NVS). In this case the radioactivity release to environment will be minimized due to filter decontamination of the released air (decontamination efficiency is 99,9 %), except the emergency scenario with release filtration system failure.

During works in Turbine Hall, on ASRU, Unit V and Deaerator Stack roof the gas-aerosol environmental release (in case of normal works performance and under various potential accidental scenarios) will be implemented directly from the work production areas.

During normal works performance on reconstruction of ChNPP Stage II (Power Units 3,4) Main Building with reinforcement and sealing of structures, which perform NSC enclosing perimeter functions, the controlled discharges of radioactive and hazardous chemicals to environment are not envisaged. Also no significant increase of Gamma EDR outside the work production areas is envisaged.

During works on reconstruction of ChNPP Stage II (Power Units 3,4) Main Building with reinforcement and sealing of structures, which perform NSC enclosing perimeter functions, use of limited number of plant and standard construction technologies, as well as insignificant consumption of water and power resources is anticipated. Therefore non-radioactive environmental impacts will not be of particular nature compared to similar erection-construction activities in normal environment.

3. Potential environmental impacts assessment

The facilities of potential impact during works on reconstruction of ChNPP Stage II (Power Units 3,4) Main Building with reinforcement and sealing of structures, which perform NSC enclosing perimeter functions, are the environmental, technogenic and social components.

The peculiarity of environment in the zone of design activities is that radiation impacts on environment will be added to already existing significant technogenic post-disaster contamination of this territory.

The main source of environmental radiation impacts will be an atmospheric release of radioactive aerosols, their further air transport and deposition on the underlying terrain of the territory of the design activities impact zone. So the environmental facilities exercising radiation impacts are air and water environment, soils, flora and fauna.

The assessments performed prove that under normal conditions of works performance the maximum possible activity concentration of radionuclides in air will be observed at 0,2 km distance from the source of release (the height point of release is 2 m), and will not exceed $0,002 \text{ Bq/m}^3$; at 0,5 km distance it will be $0,001 \text{ Bq/m}^3$. So, the maximum forecasted values will not exceed Reference Levels of atmospheric air contamination, established at SSE ChNPP for the Free Access Area ($1,5 \text{ Bq/m}^3$ – for the mixture of beta-radioactive nuclides, and $0,02 \text{ Bq/m}^3$ – for the mixture of alpha-active nuclides).

On the border of the I-st radiation-regime zone (10-km zone) the levels of the additional contamination of the near-surface atmosphere will amount to about $6 \cdot 10^{-6} \text{ Bq/m}^3$, which is several orders less than the established Reference Levels of atmospheric air contamination in 10-km zone.

Under normal works performance conditions the radionuclide intake to the surface water will not exceed $3,4 \cdot 10^8 \text{ Bq/year}$, which is much less than the annual radionuclide export with river Pripyat water during dry years and is equal to approximately $2,0 \cdot 10^{12} \text{ Bq/year}$. So the additional radiation impacts on the surface basins due to design activities implementation are really minor.

Summary additional surface contamination on the border of 10-km zone due to design activities will not exceed the following values:

- Beta-active radionuclides- no more than $0,05 \text{ Bq/m}^2$;
- Alpha-active radionuclides- no more than $0,005 \text{ Bq/m}^2$.

The above maximum values of the additional surface contamination will be observed within the boundaries of the I-st radiation-regime zone (10-km zone) at the territory of the Exclusion zone. Currently existing radioactive beta-contamination of soil surface for the 10-km zone vary from 0,5 to 60 MBq/m^2 , while alpha-contamination vary from 1 to 400 kBq/m^2 . So, the additional contamination of soil within the 10-km zone will not exceed 0,0003 % of the current contamination with beta-active radionuclides, and less than 0,0001 % of the current contamination with alpha-active radionuclides.

For the rest of the Exclusion Zone territory (outside 10-km zone) the values of density of soil contamination with β -exposing radionuclides and α -exposing radionuclide are within the intervals ranging from 20 to 450 and from 0,1 to 4 kBq/m^2 correspondingly. Summary additional surface contamination on the border of the 30-km zone due to NSC EP activities will amount to approximately $0,01 \text{ Bq/m}^2$.

So, the additional soil contamination on the border of the 30-km Exclusion Zone will be negligibly small.

Additional flora and fauna radiation impact will be stipulated by radioactive aerosols deposition on soil, flora and water bodies. However on the background of the existing contamination of these environmental components the additional flora and fauna impact will be minor.

The additional internal exposure dose of the personnel staying in settlement zone (at a distance more than 10 km from the work production area), will amount to not more than $9 \cdot 10^{-6}$ mSv. No food is allowed for production in this zone, therefore the only way for radionuclides intake is inhalation. RL of internal exposure doses for the personnel of sub-group II makes 0,7 mSv/year. So the additional exposure dose for these personnel due to the planned NSC EP activities will be negligibly small.

Additional dose exposure of the public staying outside the Exclusion Zone will be negligibly small against the quote of exposure dose limit of 40 mSv, established by HPBY-97 for NPP or RAW Processing Plants.

Technogenic impact will be associated with additional radioactive contamination of facilities in the Exclusion Zone and additional exposure of these facilities personnel. Among various technogenic facilities located outside SSE ChNPP Industrial Site, at 2,3 km distance there is ISF-2. The assessments performed prove that radionuclide air concentrations and additional internal dose exposure of ISF-2 personnel is for 3-5 orders lower than the Reference Levels established for SSE ChNPP. Additional surface contamination at ISF-2 site accumulated during performance of activities on reconstruction of ChNPP Stage II (Power Units 3,4) Main Building with reinforcement and sealing of structures, which perform NSC enclosing perimeter functions, is approximately 3 orders lower than the Reference Levels (with conservative non-consideration of wash-out from the surface and radionuclide decay).

The Working Design includes technical decisions on reconstruction (relocation) of ChNPP Stage II engineering networks and equipment being in the zone of NSC EP construction. Implementation of these technical decisions will allow for safe current operation of OS and Power Unit-3 technological systems.

The Working Design also envisages measures to ensure, during the works on NSC EP construction, stability of OS and Power Unit-3 structures directly adjoining NSC EP. Stability of the above structures during works on NSC EP construction does not decrease.

The Working Design confirms the necessity of deconstruction with partial reinforcement of the existing OS structures, standing proud of the NSC EP; conceptual decisions and recommendations on the time of these decisions implementation (during 5 years after completion of NSC CS-1 construction) are developed.

So under normal conditions of works performance on reconstruction of ChNPP Stage II (Power Units 3,4) Main Building with reinforcement and sealing of structures, which perform NSC enclosing perimeter functions, the additional environmental, technogenic and social radiation impact is significantly less than the national and regional radiation-hygienic regulations, and are quite acceptable from the standpoint of ecological safety assurance.

Environmental radiation impact in case of potential accidents during works production will not exceed radiation-hygienic regulations, established by HPBY-97 for radiation accidents.

4. Comprehensive measures to minimize the additional environmental impacts

To minimize the additional environmental impacts the resource-saving, protection and security measures are envisaged in the design.

The working design envisaged resource-saving measures cover:

- Optimization of design decisions to minimize scope of the works performed and required resources;
- Use of standard equipment and techniques to perform deconstruction and construction works;
- Use of SSE ChNPP existing infrastructure to implement the design.

Protection measures include:

- Dust-suppression, dust-fixation and decontamination;
- Use of efficient air purification system for the NVS releases;
- Use of a standard water collection system at lower elevations of Deaerator Stack and Turbine Hall;
- Arrangement for safe management of generated RAW;
- Efficient physical protection preventing unauthorized spreading of radioactivity.

Security measures include monitoring of the territory of the zone impacted by the planned activities. Radiation monitoring includes:

- Continuous monitoring based on the stationary (fixed) automated measuring tools;
- On-line monitoring based on portable movable measuring tools;
- Laboratory control based on the fixed laboratory measuring tools.

The developed activities will ensure safe level of residual impacts on all environmental facilities in regard to their additional contamination and generation of RAW during activities on reconstruction of ChNPP Stage II (Power Units 3,4) Main Building with reinforcement and sealing of structures, which perform NSC enclosing perimeter functions.

5. SSE ChNPP Ecological Safety Assurance obligations

State Specialized Enterprise “Chernobyl NPP” will ensure:

- safe works performance in accordance with the valid Ukrainian Laws, construction codes and normative documents associated with radiation protection and Radwaste management, as well as other documents regulating SSE ChNPP activities;
- Continuous monitoring of all activities on reconstruction of ChNPP Stage II (Power Units 3,4) Main Building with reinforcement and sealing of structures, which perform NSC enclosing perimeter functions, to meet the requirements of Ecological Law.

Within the boundaries of the planned activities on reconstruction of ChNPP Stage II (Power Units 3,4) Main Building with reinforcement and sealing of structures, which perform NSC enclosing perimeter functions, SSE ChNPP ensures non-excess of radiation-hygienic regulations of environmental impacts.

SSE ChNPP as an Operator is bearing the complete responsibility for any consequences related to violations of normal conditions of the works on reconstruction of ChNPP Stage II (Power Units 3,4) Main Building with reinforcement and sealing of structures, which perform NSC enclosing perimeter functions.

To inform public about any planned activities the following activities are envisaged in accordance with the Working Design “Reconstruction of ChNPP Stage II (Power Units 3,4) Main Building with reinforcement and sealing of structures, which perform NSC enclosing perimeter functions”:

- contacts with public organizations and mass-media;
- information to “ChNPP News” paper;
- maintaining of information regarding this Project on SSE “Chernobyl NPP” web-site www.chnpp.gov.ua.

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