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PAPER TITLE OPTIMISATION OF RADIOLOGICAL PROTECTION AT THE DESIGN STAGE OF NUCLEAR
INSTALLATIONS: RECENT EXPERIENCES WITH ALARA TOOLS

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ABSTRACT (See instructions overleaf)

Implementing the optimisation principle at the design stage of nuclear installations involves to maintain the collective exposures as low as reasonably achievable keeping at the same time a fair distribution of individual doses among exposed groups (equity principle). This general objective can only be achieved by anticipating from the very start of the design phase, not only the doses that can be received by workers but also how the levels of exposure will be distributed among them.

The assessment of workers exposures heavily rely on the feedback experience which provide necessary data as well as on specific tools to estimate dose rates and to combine all relevant exposure parameters. The detailed radiological analysis of technical options must be done through source-terms identification and assessment, the description of future operating modes, the prediction of incidents, the knowledge of workers locations and physical characteristics of the conceivable biological shielding. Then, all these data must be integrated with appropriate tools to *a priori* determine the most exposed areas, important sources, efficient protections and constraining tasks.

These tools devoted to the evaluation and selection of technical options at the design stage must be compatible with complex sensitivity analyses to properly quantify the efficiency of possible corrective actions of protection (e.g. reinforcement of biological shielding, withdrawal and specific shielding of sources, moving workers away from "hot spots" using robotics tools or remote controls...).

Methods and adapted tools developed during recent years at CEPN to help nuclear designers will be presented in the poster and in the corresponding paper.