

INTERNATIONAL APPROACHES TO ASSESSMENT OF EXPOSURE DOSE TO POPULATION DUE TO DISCHARGES FROM NUCLEAR POWER PLANTS INTO WATER BODIES

D. Huseinava

*Belarusian State University, ISEI BSU,
Minsk, Republic of Belarus
dianahuseinava@gmail.com*

Different ways of exposure of the population from discharges of nuclear power plants to water bodies are presented. The main parameters that are used to determine the annual effective doses are indicated.

Keywords: effective dose, nuclear power plants, emission sources, routes of exposure, external exposure, internal exposure, radionuclides, dose conversion factors.

The assessment of exposure doses to population due to discharges from NPP into water bodies for each source and radionuclide is carried out taking into account the results of the analysis of the water system, determination of the types of water use at critical sites and the corresponding routes of population exposure, calculation of dilution factors in typical elements of the water system and determination of the list of standardized sources of discharges and radionuclides.

The basis for determining the dilution factors in water bodies is a two-chamber model that takes into account the redistribution of radionuclides between water and bottom sediments.

Sources of discharges are determined depending on the technological processes taking place at the NPP.

The pathways of exposure of the population are considered based on the analysis of water use and the vital activity of the population in the area of the NPP. It is necessary to consider the following population exposure pathways from liquid discharges of radionuclides:

- external exposure when swimming in a body of water;
- external exposure during the extraction of water resources;
- external exposure from being on the beach;
- external exposure from exposure to flood lands;
- external exposure from being on the irrigated agricultural land;
- internal exposure from fish consumption;
- internal exposure from vegetable products from irrigated agricultural land;
- internal exposure from the consumption of meat and milk of cattle which get radionuclides at the expense of watering and grazing on irrigated lands;
- internal exposure due to drinking water consumption;
- internal exposure from swallowing water when swimming.

To determine the annual effective doses for the above exposure pathways for each radionuclide, annual discharge, dilution factor, time spent on a particular type of water use during the year (external exposure) or annual consumption of products (internal exposure), dose conversion coefficients and interfacial distribution coefficients are taken into account.

The values of the parameters used to determine the doses from different population exposure pathways are established on the basis of regional field studies. The recommended reference data is allowed in the absence of the necessary information.

Therefore, the approaches for the assessment of exposure doses to population due to discharges from NPP into water bodies are formed on the basis of the technological processes occurring at the NPP, the parameters of the water-cooling pond in which the discharges are carried out, as well as the analysis of the population's water use and life activity in the area of the NPP location.

BIBLIOGRAPHY

1. Курындин, А. В. Методическое пособие по вопросам регулирования выбросов и сбросов радиоактивных веществ в окружающую среду. Ч. 2. Регулирование сбросов радиоактивных веществ в водные объекты / А. В. Курындин, А. А. Строганов, А. С. Шаповалов, Н. Б. Тимофеев. – М.: ФБУ «НТЦ ЯРБ», 2017. – 114 с.
2. Киселев, В. П. Моделирование миграции радионуклидов в поверхностных водах / В. П. Киселев, А. В. Носов, А. Л. Крылов, С. В. Казаков // Ин-т проблем безопасного развития атомной энергетики РАН. – М.: Наука, 2010. – 253 с.