In practice, there are concepts like "half reduction layer" and "attenuation coefficient" (streak or mass) in use. The most common absorbent material is aluminium. There exists a significant amount of empirically obtained data on the interaction between this element and β-particles.

The present work includes the research of β-particles flux radiated with checking source (^{90}Sr), as well as flux attenuation by aluminium. The set of β-radiation energy spectra was measured for the comparative analysis. There was a simple source spectrum without an absorber, and radiation spectra using absorbing layer of the varied thickness. The absorbing layer was made as a set of aluminium plates, overlaid one to the other.

The received data on the attenuation of β-radiation flux correspond to the theory for the given nuclide. The calculated mass attenuation coefficient is according to the table value with an accuracy up to 25 %. The imprecision can be explained by the inhomogeneity of the absorbing layer and inevitable presence of the decay product of ^{90}Sr – ^{90}Y – in the sample. This radionuclide has a different cutoff energy of β-spectrum and, consequently, different attenuation coefficient.

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RISK ASSESSMENTS AT NUCLEAR POWER PLANT (NPP)

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Today the NPP energy production is constantly and intensively increasing in the world, resulting in the growth of different threats under its exploitation caused by natural and manmade factors, which include possible directed terrorist attacks. It is necessary to use correct assessments of corresponding risk levels during NPP projecting, building and exploitation under its complex integrated emergency management [1]. In the paper some possible methods of risk assessments and the use of the universal formula for calculating the total vector of limited losses under NPP exploitation for fixed time interval under the following assumptions have been analyzed [2]: (1) at initial state the object is in normal (non accidents) exploitation; (2) the different types of accidents can occur as noticed i =2, 3, …, m, where *m* is a total number of possible accidents (*m*=1 is corresponded to the normal regime); (3) every accident may create the different kinds of losses; (4) realization of *i* accident creates the loss of *j* kind with P_{ij} probability:

$$\vec{a}_{\lim} = P(1)\vec{a}_{1n} + \sum_{i=2}^{m} \hat{P}_{ij}\vec{a}_j \qquad (1)$$

Here *j* is the kind of loss with a_j value. Then $j = 1,2, \ldots n$, where *n* is a total number of possible kinds of losses; where *P(*1) is the probability of loss formation under normal exploitation; $\vec{a}_{1n}$ is the vector of limited loss under regular exploitation. $P_{ij}a_j$ value in sum is equal to the loss value of *j* kind under realization of *i* kind accident. Under accident absence (normal regime), $\vec{a}_{\lim}$ is determined only by the first part of (1) the formula.

The main problem is P_{ij} value assessment. Usually the representative statistic data for its assessment are present only for long NPP normal exploitation period. Earlier we predicted the irradiation doses and corresponding risks for population under the implementation of Russian Federal Program "Development of Russian atomic energy industrial complex for the period 2007-2020 at 10 homelands NPP operating during some last decades [3]. Such data are absent for NPP non-prognostic emergencies, when part of the needed information can be obtained only after the disasters. Some NPP, located in dangerous regions, are exposed to negative natural responses (earthquakes, tsunami, etc.), as well as there are manmade ones are in dangerous conflict zones with high terrorism threats. In these situations the use of classic methods for expertise risk of NPP assessments are not correct and often impossible at all. Some required data can be obtained from primary virtual computer tests of individual NPP with imitation of possible disasters. It allows planning the actions for NPP operators and special services under serious NPP disasters or may prevent them at all. These thematic problems connected with such NPP, as Fukusima, Seversk in Tomsk region, Armenian, three future NPP in Kazakhstan, and Nuclear terrorism are also under consideration in this work.

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ВОПРОСЫ ОБЕСПЕЧЕНИЕ ЯДЕРНОГО НЕРАСПРОСТРАНЕНИЯ В РЕСПУБЛИКЕ КАЗАХСТАН

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Политическая реальность на сегодняшний день демонстрирует невозможность игнорирования проблемы ядерной безопасности, которая оказывает все возрастающее влияние на жизнедеятельность как больших, так и малых государств в условиях резкого усиления их глобальной взаимозависимости.