

*Pratheepkumar V.*

## **SOME ASPECTS OF THE RADIOLOGICAL CONSEQUENCES OF THE FUKUSHIMA DAIICHI NUCLEAR POWER PLANT ACCIDENT**

*Tutor: PhD, associate professor Goltsev M.V.*

*Department of Medical and Biological Physics*

*Belarusian State Medical University, Minsk*

**Relevance.** The 2011 Fukushima Daiichi nuclear accident released significant radiation, necessitating understanding of long-term effects on the environment and human health for future disaster response strategies and mitigating potential harm.

**Aim:** The study aims to compare the exposure dose rate in a 20km controlled zone around the NPP from the accident to today.

**Materials and methods.** The Hitachi PDR-111 Pocket Survey Meter is a lightweight scintillation survey meter that detects Gamma and X-ray radiation using a CsI scintillator. It measures radiation energy from 50keV and has an accuracy of  $\pm 15\%$ . The meter has a 4-digit LCD display and can measure from 0.001 to 19.99 $\mu$ Sv/h. It was carrying out measurements on the 20km zone of the NPP on 2019. Textbooks, scientific literature, articles, various Internet resources on this issue were used; experiment, analysis, and comparative analysis were used as materials as well.

**Results and their discussion.** On November 12, 2011, according to ITAR-TASS, the maximum ambient dose rate near the Fukushima-1 NPP, recorded by Japanese and foreign journalists, was 300 $\mu$ Sv/h, which is 850 times higher than the norm /0.2 $\mu$ Sv/h. Also, according to the “New York Times”, this level of radiation was recorded by journalists when approaching the damaged reactors. The previously reported 50 $\mu$ Sv/h was recorded 500 m from the NPP. Specialists from the Institute of Nuclear Power Plant Safety Problems of the National Academy of Sciences of Ukraine declared, that the exposure dose rate within a 20-km zone ranged from 160  $\mu$ Sv/h on March 18, 2011 to 20 $\mu$ Sv/h on April 14, 2011, and within a 30-km zone the same dependence ranged from 60 up to 18 $\mu$ Sv/h, respectively. According the measurements took from the zone, from 20km the decrease of length showed the increase of range as(0.467, 0.448, 0.500, 0.589, 0.985, 1.108, 1.147, 1.152, 1.231, 1.384, 1.415, 1.469 $\mu$ Sv/h) on the border of nuclear power plant territory showed rapid increase of range from 1.469 $\mu$ Sv/h to 7.37 $\mu$ Sv/h. As of October 20, 2022, Nature/Scientific reports (2023) 13:22459 gives the following data. At the border of the 20-km zone, the dose rate was 0.15-0.21 $\mu$ Sv/h, beyond it and at a depth of up to 30 km it was 0.053-0.086 $\mu$ Sv/h. Within a 10-km zone, the radiation level was already 0.28-0.38 $\mu$ Sv/h, and in a 5-km zone from the NPP 0.68-0.90 $\mu$ Sv/h.

**Conclusions.** Studies have shown that radiation levels in the surrounding 20-kilometer zone of the Fukushima-Daiichi nuclear power plant still remain higher, especially immediately in front of the destroyed power units. In general, in Fukushima Prefecture, measured dose rates are within the range of 0.11-0.12 $\mu$ Sv/h, with the exception of a designated 20-kilometer zone around the nuclear plant, where the dose rate increases sharply from 0.15 $\mu$ Sv/h to 1.2 $\mu$ Sv/h immediately before the exclusion zone of the NPP. At the same time, the research carried out suggests that the consequences of the accident associated with exposure to radiation do not cause serious harm to society today.