Abstract ID: **\*\*\***

**Accident Analysis of the Process of Transferring**

**Cobalt-60 Radioactive Waste of Teletherapy Machine into the Transport Container with Fault Tree Analysis (FTA) Method**

**Content**

The use of nuclear technology in the medical world has multiplied. One modality that uses a nuclear source is a teletherapy machine. The most widely used source of teletherapy today is cobalt-60. When the teletherapy machine does not meet the standards for external radiotherapy, it must be discarded. Approximately 5 to 7 years of use must be replaced with a new source. Based on the Nuclear Energy Regulatory Agency of Indonesia’s (BAPETEN) Chairman Regulation Number 6 of 2015, radioactive waste from teletherapy machines is classified as Category 1 Radioactive Sources. The cobalt-60 waste must be sent to the Center of Radioactive Waste Management Organization (PRTLR) of Indonesia, which legally manages the radioactive waste in Indonesia. Currently, each of the spent radioactive waste sources of cobalt-60 in Indonesia uses a teletherapy head as a container. The head teletherapy as a container requires a larger storage space than the existing storage area in PRTLR. Therefore, it is necessary to design a new transport container. It is crucial to do an accident analysis first. One of the well-known analytical methods is Fault Tree Analysis (FTA).

In this study, an analysis of the causes of accidents that may occur while transferring the spent radioactive source from the teletherapy machine into the transport container was carried out. The research was conducted first by determining a scenario with two transportation options. The analysis was carried out using the Fault Tree Analysis (FTA) method. The method was used to determine undesired events (Top Events) that could cause radiation exposure over the limits for both workers and the environment. The next was to determine Intermediate Events connected with logic gates and then obtain Basic Events. All events that had been obtained were then graphically described to form a fault tree using the software. The next step was to determine the failure rate of each Basic Event based on published generic data. It was followed by determining the minimum cut set of every Top Event, sequence of events, probability, and the most significant factors that cause accidents in transferring spent radioactive sources from a teletherapy machine into a transport container.

This study shows that the use of FTA for accident analysis in the Cobalt-60 teletherapy machine radioactive source waste disposal process can be used. Accident analysis in the teletherapy waste transfer process is carried out by developing a transfer scenario. Based on the research that has been done, it resulted in 29 minimal cut sets, and the failure of all 29 basic events could cause the accident in the process of moving the Cobalt-60 radioactive waste. Radiation exposure events that exceed the limit have a probability of 9.76×10-3 or 0.976%. This value can be categorized as still safe and could still meet the safety standards.

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**Track Classification:** (-)

**Contribution Type:** Poster

Submitted by **PRABANINGRUM, Nunung** on **15 October 2021**