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Safe Transport of Decommissioned Radiotherapy Co-60 Source from Amazonia to the Source Repository in Southeast Brazil

The decommissioning of a Co-60 source from a radiotherapy unit at a public hospital in Rio Branco (High Complexity Oncology Unit –Unacon) in Acre State, located at Brazilian Amazonia region, required complex multimodal transport to the Center for Development of Nuclear Technology repository in Belo Horizonte, Minas Gerais.

Due to limited infrastructure in the Amazonia region, the transport involved road transport (~3500 KM) via BR-364 and a waterway transport crossing on the Madeira River at Abuna (RO), facing challenges unique to the Amazon region, such as poor road infrastructure, river piracy risks, and remote logistics. This multimodal transport was authorized under the UN 2919 special arrangement (Radioactive Material Transported under Special Arrangement, Non-Fissile or Fissile-Excepted), in compliance with international IAEA regulations (SSR-6, GSR Part 7, NSS No. 9) and national CNEN standards (Norm CNEN-NE-5.01 for Transport of Radioactive Materials, Nota tecnica conjunta IBAMA-CNEN 01-2013).

This work presents a case report on the safe transport of a disused radiotherapy Co-60 source with an initial activity (calibration date 2005) of 6000 Ci (222 TBq). The obsolete radiotherapy equipment decommissioning process began with the dismantling of the shielded head (approximately 2 tons), conducted in July 2019 under the supervision of a medical physicist and radioprotection team, in compliance with Brazilian National Nuclear Energy Commission (CNEN) standards NE-6.02 and NN 3.01. The source was extracted with the original manufacturer shielding to minimize gamma radiation exposure. To keep stability during transport the shielded Co-60 source was transferred to a "cradle"support.

The destination selected was the radioactive source repository at the Center for Development of Nuclear Technology (CDTN) in Belo Horizonte , Minas Gerais, the primary national repository for low- and medium-level radioactive waste, licensed by CNEN for receipt, treatment, and temporary storage of radioactive materials.

The transfer was executed under a special arrangement (UN 2919), in accordance with international transport regulations for radioactive material. The multimodal route combined road and river segments, including a fluvial crossing by ferryboat over the Madeira River between the states of Acre and Rondonia—an essential link due to limited road infrastructure in the region.

Security and operational coordination involved multiple agencies: the Institutional Security Office of the Presidency of the Republic (GSI), the Brazilian Federal Highway Police (PRF), and different State Military Highway (PMRE). These entities provided tactical escort, route surveillance, and contingency support throughout the journey. Notably, aerial monitoring using drone was employed to enhance situational awareness, verify convoy integrity, and support real-time decision-making in remote or high-risk segments of the route, aligned with physical protection guidelines for radioactive material transport (CNEN NN 2.05).

This operation exemplifies Brazil's commitment to nuclear safety and security, demonstrating the effectiveness of Special Arrangement frameworks, highlights the importance of inter-agency coordination and the integration of advanced technologies—such as drone surveillance—in the transport of high-activity radioactive devices.

Country or International Organization

Instructions

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