

Switching from a Cesium-137 Blood Irradiator to an X-ray Irradiator – Experience at a Community-based Hospital in the Northeastern U.S.

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Blood Irradiators are often used to irradiate blood and blood components prior to transfusion to prevent the proliferation of certain types of T lymphocytes that can inhibit the immune response and cause graft-versus-host disease. Morristown Medical Center, which is part of Atlantic Health System based in the northern part of New Jersey, USA, employed a Cesium-137 Blood Irradiator for about 20 years.

On November 14, 2005, the U.S. Nuclear Regulatory Commission (NRC) issued Order EA-05-0902, imposing increased controls for certain high-risk radioactive materials such as those contained in the Blood Irradiators. On December 5, 2007, the NRC issued Order EA-07-3053, imposing fingerprinting and criminal history records check requirements for unescorted access to certain radioactive material. These increased control (IC) requirements were imposed on radioactive materials of concern⁴ such as Cesium-137 (Cs-137) with activities greater than or equal to 27 Ci (1 TBq).

During the time of the IC orders, Morristown Medical Center's Blood Irradiator contained approximately 1400 Ci (52 TBq).

Security enhancements, as well as response protocols were set in place, in order to comply with the USNRC Increased Control Orders, as well as 10 CFR 37. These included, but were not limited to, "trustworthiness and reliability" background checks, fingerprinting, FBI identification, criminal history records check, reinvestigation every 10 years for any individual with unescorted access, establishment of security zones and continuous physical barriers, continuous monitoring and detection of all unauthorized entries into security zones, and initial and annual training for the Security staff and Local Law Enforcement Agencies.

The facility eventually came to the decision to replace the Cesium irradiator with an X-ray Irradiator. Factors such as irradiator performance, prohibitive regulations, security issues and cost savings, that affected the decision, will be elaborated on. It is worth noting that the switch from a Cesium irradiator to an X-ray irradiator resulted in a quicker turnaround time and increased irradiation capacity per unit time, among other advantages.

A few factors that typically deter facilities from switching to X-ray technologies, will be discussed. These factors are generally rendered obsolete by updated technology as well as outweighed by the incurred advantages of switching.

Finally, a visual description of the day when our Cesium Irradiator was picked up for disposal, will be presented.

It is hoped that our experience will engage other facilities to do the same in terms of replacing their Cs-137 irradiators with technologies that yield better performance and result in much less vulnerability from theft and sabotage involving high-activity radioactive materials.

State

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Gender

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