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Gamma Irradiator Technology: Challenges and Future Prospects

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Gamma irradiator technology has served the bulk irradiation industry very well. Sterilization of medical disposables has been the most popular application followed by irradiation of food and other products. However, it has faced number of challenges in its journey so far. The initial irradiators utilized Cs-137 sealed sources in highly soluble chloride form. Wet storage irradiators had risk of contamination due to Cs-137 sources. There were incidents of irradiator facility and surrounding soil contamination due to source leakage. Availability of Co-60 in metallic form came handy to surmount this challenge. Over-exposure of plant personnel while carrying out maintenance has been reported. With the improvements in safety systems, this challenge was adequately tackled. Later, shortages of Co-60 in addition to high prices coinciding with availability of the challenger linear accelerator technology became the biggest challenge. Higher capital cost in addition to higher running cost of the LINACs was though a deterrent. Also, non-availability of reliable power supply in different parts of the world was an additional factor in accelerators not replacing the gamma irradiators at faster pace.

The most recent challenge to gamma irradiator technology has come due to heightened security risk the world is facing now. There are fears being raised regarding security of the high intensity radioactive sources in such irradiators. The security challenge is due to fear of the sources going into wrong hands. This possibly could happen when sources are in installed position or more so during their transportation. Such fears have forced the authorities to strengthen the regulations. Shipping companies have become reluctant to carry radioactive materials, particularly when trans-shipment is involved. There are number of instances of denial of shipments making the situation worse. The maximum activity which can now be carried in a Type B(U) container is also limited to only 30kci of Co-60 whereas the requirements in industrial irradiators is much higher which makes the transportation by air exorbitantly high. The other requirement of regulatory body to obtain guarantee of return of sources to the original supplier is another impediment. To prevent stealing of sources when those are in installed position, hardening of facilities or devices needs to be carried out so that response time for the security agency in case of theft attempt is shorter than what is needed by the adversary to remove the sources from the device and shift those to a makeshift container. Lastly, challenge due to possible dismemberment of installed sources which can result in large areas becoming inaccessible due to contamination is forcing the operators to think hard before making a choice. Accelerator Technology being "ON-OFF", does not have such drawbacks. Because of this, LINACs have gained much higher importance in recent times. Additionally, LINAC's lower efficiency of conversion of energy to electromagnetic radiation and its dependence on availability of economic and reliable power supply will eventually decide the time at which it replaces the gamma irradiator technology fully in any particular part of the world.

Country/Organization invited to participate

India

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