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Preventing a Dirty Bomb: Case Studies and Lessons Learned

Today, tens of thousands of high activity radioactive sources are used in over 100 countries. They are used in medicine, industry, agriculture, academic, and government facilities for a variety of beneficial purposes. Many of these sources are poorly secured, vulnerable to mishandling or even theft by terrorist organizations seeking the materials needed for a radiological dispersal device (RDD), often referred to as a "dirty bomb." Cesium-137 is of particular concern, as it the most dangerous radioactive material that can be used in a (RDD). The economic impact of a Cesium-137 bomb explosion could be in the order of tens of billions of dollars.

The purpose of this paper is threefold. First, we propose a shift in paradigm, from a security perspective geared towards risk reduction to a public health approach invested in risk elimination. We are currently at a moment where new technologies can safely and effectively replace many Cesium-137 devices with equal or even improved outcomes. This is certainly the case with blood irradiation devices, where the consensus on the benefits of x-ray irradiators have led several countries to eliminate their use and others to prioritize their replacement. The marketplace in many countries has already seen the uncoordinated and voluntary replacement of Cesium-137 for blood irradiation. Similarly, there is growing consensus that x-ray devices can meet and exceed medical and research goals of Cesium-137 devices for a wide range of uses. The paper will provide a brief overview of the current state of efforts that aim at eliminating the use of Cesium-137 irradiators for blood sterilization and research, including interviews with blood bank operators and research scientists who have adopted the new technologies successfully in their programs.

Second, in the absence of regulatory requirements, this paper will propose a model for achieving voluntary permanent threat reduction at institutions within major urban areas. The paper will highlight factors that encourage voluntary replacement of Cesium-137 devices, identify key roles played by regulators and decision makers at different levels of government in implementing Cesium-137 substitution strategies. The paper will highlight the incentives, challenges, and information gaps that shape decisions to adopt a public health paradigm for managing the inherent risks of Cesium-137 irradiators. To this end, the authors will argue for the creation of an "advocacy network"of organizations and individuals committed to cesium replacement. This network would facilitate collaboration and share experiences amongst users and create informal channels for distributing information on latest technological advances, practical experiences with converting to alternative technologies, comparative research studies, and fiscal implications of converting to devices that pose no terror risks. The network would also provide assistance to those navigating the process of technological substitution by tracking and documenting regulatory changes and voluntary substitution efforts across the globe; supply the necessary infrastructure to coordinate voluntary threat elimination efforts across institutions, regions and national governments; and serve as the public facing clearing house of efforts aiming to eliminate risks through the use of alternative technologies.

Thirdly, the paper will recommend that IAEA Member States encourage the IAEA to promote alternative technologies to radioactive sources and provide guidelines that support States in their implementation of INFCIRC/910 on the Joint Statement on Strengthening the Security of High Activity Sealed Radioactive Sources. While there are clear viable alternatives for Cesium-137 irradiators, more research is needed to develop equivalent alternatives for other radiation sources. The authors believe that IAEA Member States should encourage the IAEA to promote and support research efforts on the development of technically and economically realistic and acceptable non-HASS technologies, incorporating in these efforts the manufacturers, end-users, standards-setting bodies, and technical experts. IAEA engagement on alternative technologies could include formally incorporating alternative technologies into key planning documents such as the next Nuclear Security Plan, coordinating the development of standards and guidance for alternative technologies, and facilitating sharing of information related to alternative technology to support the decision-making of operators, regulatory bodies, and other competent authorities. In a world where there are heightened concerns about radiological terrorism as well as increased requests by Member States for access to effective cancer care, alternative technologies can simultaneously support public health needs and risk elimination to build a healthier, more secure world.

State

Other

Gender

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Track Classification: CC: Innovative technologies to reduce nuclear security risks and improve cost effectiveness, where feasible