**Kari Peräjärvi: Dirty bomb - possible new threat**

Radioactive sources, like Co-60 or Cs-137, with high nominal activities have many practical applications. They are frequently used, for example, in industry and medicine. Physical security arrangements of these sources are undoubtedly good but not at the same level with nuclear materials or weapons. Same also applies to their transportation. Based on these facts it is commonly believed that radioactive sources pose higher risk for getting outside of regulatory control than nuclear materials or weapons. Notice that some nuclear and other radioactive materials are already beyond regulatory control and part of them are in the possession of criminals.

Dirty bomb is one way to use radioactive materials malevolently. In dirty bombs radioactive material is placed in an easily distributable form next to conventional explosives. Explosion lifts the material in the air and the wind transfers it downwind. Due to gravity, airborne radioactive materials are slowly depositing back to earth contaminating everything under the path of the release plume. Largest radioactive particles obviously fall down first. If it is raining the deposition of airborne radioactive particles is faster. Rain causes a so called wet deposition. During the event, people can become internally and externally contaminated.

Explosion of a dirty bomb creates four kinds of consequences: health, economic, environmental and societal. Even if a source with high nominal activity is exploded it is quite probable that there would be no immediate casualties caused by the absorbed radiation dose. Use of radiation would however significantly boost other consequences because of the stochastic effects of radiation to humans. Measurements and decontamination of influenced people, animals and environment would, for example, require a lot of resources. Also the amount of radioactive waste could be extensive since, for example, pavement material of roads and buildings near the explosion site might need to be replaced and all the contaminated material including trees and plants removed. Societal consequences would also be significant. Explosion of a dirty bomb would create a lot of concern and panic to the public and it could also have political consequences especially if citizens lose their confidence on decision makers and authorities.

Primary goal of nuclear security activities is to prevent events like this from ever happening. The goal is pursued with risk-based security arrangements of radioactive sources and risk-based Nuclear Security Detection Architecture (NSDA) for the detection of nuclear and other radioactive materials out of regulatory control before they are malevolently used. NSDA includes both technical and non-technical components, i.e., efficient information sharing between the authorities is of the utmost importance. National plans and procedures need to be frequently exercised, reviewed and improved.