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International Policies and Tools for Protecting Against Radiological Sabotage

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This paper will provide a comprehensive overview of international policies and tools that can be used for protecting against radiological sabotage at nuclear and radiological facilities. This analysis is uniquely relevant for international nuclear security because there are few materials available which provide a comprehensive overview of both policy and technical context and issues associated with sabotage. The paper will be geared toward policy makers and managers who do not necessarily have a strong understanding or familiarity with the concept of sabotage and the roles and responsibilities of various stakeholders. Through describing the rising threat of non-state and unconventional actors, we will provide historical context for the threat of nuclear terrorism and sabotage After providing historical context for the rising threat of sabotage, we will describe several international policies and guidance documents geared toward addressing the threat of sabotage, including Nuclear Security Recommendations on Physical Protection of Nuclear Material and Nuclear Facilities (INFCIRC/225/Revision 5) and the Convention on the Physical Protection of Nuclear Material (CPPNM).

We will describe and provide an analysis of the factors which influence the scale of sabotage threat, including material type and quantity, type of radioactive material release (single or sustained), and type of sabotage scenarios. Several potential sabotage scenarios which can be identified in a threat assessment or design basis threat include direct versus indirect attack and a blended cyber-physical attack. Through highlighting the roles and responsibilities for the Competent Authority and site operator, the paper illustrates how respective authorities conduct threat assessments, determine thresholds for unacceptable and high radiological consequences, and identify vital areas within a site or facility which may warrant further protection. In addition, we analyze how regulators and operators can cooperate to implement mitigation measures or contingency plans in response to various sabotage scenarios.

Finally, the paper will review several software tools used to analyze sabotage threats and consequences, including the U.S. Nuclear Regulatory Commission's Radiological Assessment System for Consequence Analysis (RASCAL), Sandia National Laboratory's Turbo Federal Radiological Monitoring and Assessment Center (FRMAC) software, the National Atmospheric Release Advisory Center's (NARAC) HotSpot Health Physics code, and the Quick Look Radiological Assessment Methodology (QLRAM) developed by Pacific Northwest National Laboratory for the National Nuclear Security Administration.

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