EU-High Level Scientific International Conference on Physical Protection
"Strengthening Global Practices for Protecting Nuclear Material"
8-13 September 2002, Salzburg, Austria

Approaches to quantitative risk assessment with applications to PP

G. Geiger and A. Schäfer*

Stiftung Wissenschaft und Politik, Ludwigkirchplatz 3-4, 10719 Berlin, Germany
+49-(0)30-88007232 (phone), +49-(0)30-88007100 (fax),
gebhard.geiger@swp-berlin.org

**Institute for Safety and Reliability GmbH,*
Walther-Meissner-Strasse 2, 85748 Garching, Germany
+49-(0)89-28913900 (phone), +49-(0)89-28913949 (fax), schaefer@iisar.de

ABSTRACT

Experience with accidents such as Goiania in Brazil and indications of a considerable number of orphan sources suggest that improved protection would be desirable for some types of radioactive material of wide-spread use such as radiation sources for civil purposes. Regarding large potential health and economic consequences (in particular, if terrorists attacks cannot be excluded), significant costs of preventive actions, and large uncertainties about both the likelihood of occurrence and the potential consequences of PP safety and security incidents, an optimum relationship between preventive and mitigative efforts is likely to be a key issue for successful risk management in this field.

Thus, possible violations of physical protection combined with threats of misuse of nuclear materials, including terrorist attack, pose considerable challenges to global security from various perspectives. In view of these challenges, recent advance in applied risk and decision analysis suggests methodological and procedural improvements in quantitative risk assessment, the demarcation of acceptable risk, and risk management. Advance is based on a recently developed model of optimal risky choice suitable for assessing and comparing the cumulative probability distribution functions attached to safety and security risks. Besides quantification of risk (e. g., in economic terms), the standardization of various risk assessment models frequently used in operations research can be approached on this basis.

The paper explores possible applications of these improved methods to the safety and security management of nuclear materials, cost efficiency of risk management measures, and the establishment international safety and security standards of PP. Examples will be presented that are based on selected scenarios of misuse involving typical radioactive sources.