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Quantitative Linkages of Waste Management Options to Environmental and Human Health Risks

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Abstract - Owing to increasing population, urbanization and waste generation rates per capita, the capacity for managing wastes is exceeded by the technical, policy and material resource investment challenges in many regions of the world. This circumstance exists in spite of the fact that in 1992, many nations had agreed to develop national environmental action plans (NEAPS) under the auspices of the United Nations Rio de Janeiro Conference. Resource constraints imply that quantitative risk methodologies need to be developed and used to screen contaminated sites and management options for wastes. This is particularly necessary in lowmidlevel income countries. The principal management options are treatment to reduce volumes, contaminant concentrations and contaminant mobility to levels that pose acceptable risk levels; recycling of waste materials into products and in facilities as construction materials; and containment of wastes and contaminant sources by implementing engineered systems. Scenarios in which contaminants exist freely in various media have justifiably been the primary focus of current risk assessment methods because they pose the most immediate risks. However, exposure risks of various magnitudes exist in time and space for virtually all waste management methods. In this lecture, quantitative approaches to linking prospective performance levels of waste management methods to environmental and human exposure risks are discussed. Within the context of global sustainable development, opportunities for risk reduction through control of significant parameters are identified and analyzed.