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Ballistics Trajectory and Impact Analysis for Insensitive Munitions and Hazard Classification Project Criteria ERNEST BAKER, MARTIJN VAN DER VOORT, NATO Munitions Safety Information Analysis Centre, NATO MUNITIONS SAFETY INFORMATION ANALYSIS CENTRE TEAM — Ballistics trajectory and impact conditions calculations were conducted in order to investigate the origin of the projection criteria for Insensitive Munitions (IM) and Hazard Classification (HC). The results show that the existing IM and HC projection criteria distance-mass relations are based on launch energy rather than impact conditions. The distance-mass relations were reproduced using TRAJCAN trajectory analysis by using launch energies of 8, 20 and 79J and calculating the maximum impact distance reached by a natural fragment (steel) launched from 1 m height. The analysis shows that at the maximum throw distances, the impact energy is generally much smaller than the launch energy. Using maximum distance projections, new distance-mass relations were developed that match the criteria based on impact energy at 15m and beyond rather than launch energy. Injury analysis was conducted using penetration injury and blunt injury models. The smallest projectile masses in the distance-mass relations are in the transition region from penetration injury to blunt injury. For this reason, blunt injury dominates the assessment of injury or lethality. State of the art blunt injury models predict only minor injury for a 20J impact. For a 79J blunt impact, major injury is likely to occur. MSIAC recommends changing the distance-mass relation that distinguishes a munitions burning response to a 20 J impact energy criterion at 15 m and updating of the UN Orange Book.

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