

SYMPOSIUM ON SAFETY, QUALITY AND KNOWLEDGE MANAGEMENT IN SPACE  
ACTIVITIES (D5)

Safety of Vehicules and Ground Segment for Aerospace Missions (1)

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RISK HAZARD ANALYSIS FOR HIFIRE RESEARCH PROGRAM USING RANGE SAFETY  
TEMPLATE TOOLKIT

**Abstract**

Australia has recently introduced a new capability for space launch and re-entry Risk Hazard Analysis (RHA) into service. This capability, called the Range Safety Template Toolkit (RSTT), was originally developed for air-launched guided weapons but has now been successfully applied to a launch in the US/Australia HIFiRE hypersonics research program.

RSTT offers rapid (minutes to hours) generation of mission-specific safety templates, as well as a suite of analytical tools that enable the templates can be combined with geospatial information, such as asset locations and population densities, to provide casualty and damage estimates for operational planning and safety analysis.

As part of the preparation for the launch from the Woomera range in South Australia, a RHA was conducted using RSTT, which necessitated exercising the entire range safety process developed for RSTT. This paper describes the process as applied to the launch, which involved: the assembly, synthesis and review of the launch vehicle and payload data, the creation of a Six-Degree-of-Freedom (6-DOF) model of the vehicle including all (reasonably) possible Failure Response Modes (FRM), followed by the simulation of vehicle and debris trajectories for the nominal mission and FRMs to generate a ground impact point database. This database was then statistically processed using RSTT tools to generate range safety templates, which were then combined with relevant Woomera geospatial data in order to calculate casualty and damage estimates for the operational planning and safety analysis of the mission.