

# NASA Range Safety Program 2006 Annual Report

## DEVELOPMENT, IMPLEMENTATION, SUPPORT OF RANGE SAFETY POLICY LAUNCH AND LANDING PLANS FOR THE SPACE SHUTTLE

NASA Range Safety initiated an interagency comprehensive update of Kennedy Space Center specific risk management criteria for the launch and landing of the Space Shuttle, as well as standardized landing criteria for Johnson Space Center, Edwards Air Force Base, and White Sands Missile Complex. The results of these efforts culminated in the update of two Kennedy Space Center Plans: KSC-PLN-2805, *Range Safety Risk Management Plan for the Launch and Landing of the Space Shuttle* and KSC-PLN-2804, *KSC Range Safety Implementation Plan for the Landing of the Space Shuttle* and the backup landing sites plans.

### The Risk Management Plan

The Kennedy Space Center *Range Safety Risk Management Plan for Launch and Landing of the Space Shuttle* outlines the agency's risk management process consisting of risk assessment, hazard containment, and risk mitigation strategies for launch and landing of the Space Shuttle, while addressing the NASA policy regarding range safety (NPR 8715.5 *Range Safety Program*). It is anticipated that Kennedy Space Center pre-launch and landing planning will result in meeting all the NPR launch criteria for falling debris, toxics, and far-field overpressure hazards.

The plan will be updated by the Kennedy Space Center Range Safety Manager at least every two years to reflect current operations and risk levels. The risk management process for launch and landing the Space Shuttle includes established Air Force and NASA processes using containment and risk analysis as well as a Kennedy Space Center risk assessment process to address potential situations if residual risk violates policy criteria contained in NPR 8715.5. This risk management process involves pre-launch and landing preparation and real-time communications between the Air Force and Kennedy Space Center and results in a strong risk management methodology.

### The Implementation Plan

The Kennedy Space Center *Range Safety Implementation Plan for Landing of the Space Shuttle* outlines hazard containment and risk mitigation strategies used to implement the *Launch and Landing Risk Management Plan for the Space Shuttle* in accordance with NPR 8715.5. The goal is to meet all the procedure's individual and collective risk criteria for falling debris during nominal end-of-mission, return-to-launch-site operations. The plan is a combined effort, with Johnson Space Center providing the detailed risk analysis and Kennedy Space Center providing input data and assessing the results.

Kennedy provides Johnson with a population database for Kennedy Space Center (visitors and workforce) for use in their entry risk model. This data provides the expected numbers of people as well as their planned locations during entry. In turn, Johnson Space Center/Flight Design and Dynamics Division provides Kennedy Space Center with a detailed listing of expectation of casualty results for the public and workforce on Kennedy Space Center property. The data also highlight locations of high individual and collective casualty expectation and establishes keep-out zones that identify areas within which the individual probability of casualty ( $P_c$ ) is greater than the NPR 8715.5 criteria permits.

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The Kennedy Space Center Range Safety Manager, External Relations, Protective Services, and Shuttle Processing/Launch and Landing worked together to develop this plan that addresses the requirement to secure specified keep-out zones and to notify visitors and nonmission-essential workforce of contingency actions during the launch and landing of the Space Shuttle.