

Probability of Loss of Crew Achievability Studies for NASA's Exploration Systems Development

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Abstract: Over the last few years, NASA has been evaluating various vehicle designs for multiple proposed design reference missions (DRM) beyond low Earth orbit in support of its Exploration Systems Development (ESD) programs. This paper addresses several of the proposed missions and the analysis techniques used to assess the key risk metric, probability of loss of crew (LOC). Probability of LOC is a metric used to assess the safety risk as well as a design requirement. These risk assessments typically cover the concept phase of a DRM, i.e. when little more than a general idea of the mission is known and are used to help establish “best estimates” for proposed program and agency level risk requirements. These assessments or studies were categorized as LOC achievability studies to help inform NASA management as to what “ball park” estimates of probability of LOC could be achieved for each DRM and were eventually used to establish the corresponding LOC requirements. Given that details of the vehicles and mission are not well known at this time, the ground rules, assumptions, and consistency across the programs become the important basis of the assessments as well as for the decision makers to understand.