

Decision making under uncertainty

As part of the NRC-sponsored program to study the implications of Generic Issue 57, "Effects of Fire Protection System Actuation on Safety-Related Equipment," a subtask was performed to evaluate the applicability of formal decision analysis methods to generic issues cost/benefit-type decisions and to apply these methods to the GI-57 results. In this report, the numerical results obtained from the analysis of three plants (two PWRs and one BWR) as developed in the technical resolution program for GI-57 were studied. For each plant, these results included a calculation of the person-LEM averted due to various accident scenarios and various proposed modifications to mitigate the accident scenarios identified. These results were recomputed to break out the benefit in terms of contributions due to random event scenarios, fire event scenarios, and seismic event scenarios. Furthermore, the benefits associated with risk (in terms of person-LEM) averted from earthquakes at three different

seismic ground motion levels were separately considered. Given this data, formal decision methodologies involving decision trees, value functions, and utility functions were applied to this basic data. It is shown that the formal decision methodology can be applied at several different levels. Examples are given in which the decision between several retrofits is more »