

Risk-Informed Decision-Making Case Studies

NRC technical reviewers have always considered risk in their reviews. The NRC defines risk as consideration of the risk triplet, 1) what can go wrong, 2) how likely is it to go wrong, and 3) what would be the consequences. The current risk-informed decision-making activity is an effort to better integrate risk insights from risk analysts into wider range of regulatory reviews.

The summaries below provide examples of where deterministic reviews benefited from risk insights from risk analysts, or where risk analysts benefited from technical reviewer expertise when performing regulatory reviews in accordance with Regulatory Guide 1.174, “An Approach for Using Probabilistic Risk Assessment in Risk-Informed Decisions on Plant-Specific Changes to the Licensing Basis.” Many of these insights were provided during integrated review teams (IRTs).

Deterministic Reviews that Benefited from Additional Risk Insights from Risk Analysts

The concept of risk is integrated into all technical reviews since there are concepts of risk in the regulatory framework, defense-in-depth and safety margins. However, technical reviewers were also able to integrate information provided by risk analysts to improve their technical review.

Emergency Amendment for Emergency Diesel Generator (EDG) Completion Time.

For this review, the technical reviewers commented that they were able to move forward with approving the amendment because the risk-insights from the risk analysts provided corroboration of the licensee’s characterization that the change had a small impact on safety. By having risk insights available, the technical reviewers had more confidence in their safety decision. By having risk-insights available, the technical reviewers were able to better understand the impact of the change on plant safety.

Emergency Amendment for EDG Surveillance.

The technical review proceeded more easily because risk analysts provided insights from the plant-specific SPAR model to support the decision by the “traditional engineering” reviewers. By having risk-insights available, the technical reviewers had more confidence in their safety decision.

Regulatory Guide 1.174 Risk-Informed Reviews that Benefited from Technical Reviewer Support

Risk analysts have also identified examples where expert technical reviewer information has helped to improve their risk analyses.

Exigent Amendment Request for EDG Completion Time

Risk analysts were able to focus their review on key PRA assumptions because of the technical reviewer’s explanation of the engineering principles involved. In this case, due to detailed technical reviewer input, the risk analysts were able to dismiss several common cause issues, allowing for a more efficient review.

Amendment Request Regarding Design Code Nonconformance

The risk analysts were able to develop the regulatory findings related to defense-in-depth (principle 2 of RG 1.174) and safety margins (principle 3 of RG 1.174) more easily due to technical insights provided by the technical reviewers. Some examples included evaluating the licensee's alternate proposed approaches and acceptability of the determination of conditional failure probability (fragility) during a seismic event, which was an important input to the risk assessment. Technical reviewer input provided key information to support the risk assessment.

Suction Strainer Issues

The risk analysts were able to resolve a number of longstanding issues related to this voluntary RG 1.174 initiative related to the performance of (replaced) suction strainers because technical reviewers provided insights into engineering evaluations and assumptions which were key elements of the risk-informed approach. Issues that were challenging from a risk analysis standpoint were able to be resolved with technical reviewer input.

The above examples show that when risk analysts and technical reviewers worked together our technical reviews can be more efficient and effective. The RIDM effort is working on providing more structure to support this collaboration.