

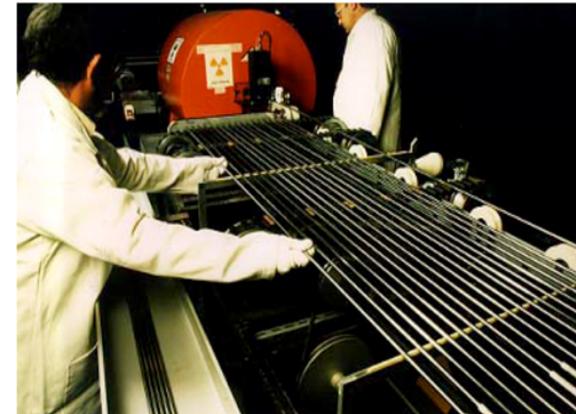
Comparison of Integrated Safety Analysis to Probabilistic Risk Assessment

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November 5, 2010

Agenda

- Introduction
- Background Information
 - Fuel Cycle Oversight Process
 - Staff Requirement Memorandum (SRM) to the Commission
- ISA Description
- PRA Description
- ISA vs. PRA
- Conclusion
- Discussion/Questions



Introduction



- Requested feedback on:
 - Critical evaluation of how ISAs differ from PRAs
 - Section V, Table 3 Critical Evaluation of ISA-PRA Differences for Fuel Cycle Risk-Significance Determination
 - Statements on methods and results of ISAs in Sections I, III, and V

Introduction (cont'd)



- Example provided in Section V
 - Methods, resources, or other challenges for performing such assessments
- Industry examples to illustrate particular points of comparison about ISAs or PRAs

Background Information



- Fuel Cycle Oversight Process (FCOP)
- Staff Requirements Memorandum for April 29, 2010 Commission Meeting

ISA Description



- Systematic analysis required by 10 CFR 70 Subpart H for major fuel cycle facilities to:
 - Identify all accident sequences leading to high or intermediate consequences
 - Identify Items Relied On For Safety (IROFS) to prevent or mitigate these accidents



ISA Description (cont'd)



- Highly unlikely and unlikely accident sequences
 - Defined by the licensee and subject to NRC approval
- Use of ISA for risk significance- sometimes conservative
 - Additional controls
 - Conservative consequences
- A few ISAs do estimate accident frequencies quantitatively, but most use the risk index method, which has some relation to frequencies

PRA Description



- Systematic method of estimating frequencies and consequences of accidents, and combining these into various risk metrics
 - Estimated quantitatively
 - Realistic estimations
- PRAs must quantify risk-significant phenomena

PRA Description (cont'd)



- Use of event trees to delineate sequences of events leading to adverse consequences of concern
 - Failure data
 - Breaking down the event into components
- Dose consequences to individuals offsite are calculated for each category of accidental radiological release

PRA Description (cont'd)



- Some regulatory applications of PRA:
 - risk significance determination in the reactor oversight program
 - safety design optimization in Severe Accident Mitigation Alternatives (SAMA) analysis
 - regulatory analysis to justify imposing new safety requirements

ISA vs. PRA

- Different purposes
 - ISA: identify hazards, accidents, and IROFS and evaluate likelihood as required by 10 CFR 70 Subpart H
 - PRA: realistic estimates of risk, individual or collective
- ISAs have been found to be acceptable for the regulatory purposes of 10 CFR subpart H
 - There is no requirement that accident sequence likelihoods be quantified as frequencies
- Great variation in types of hazards, potential consequences, risk, etc. among fuel cycle facilities

ISA vs. PRA (cont'd)



- ISA is not standardized as reactor PRA
- The purpose of ISA is not to estimate risk
- ISAs are used to demonstrate compliance with safety performance requirements in the regulations
 - Differs from PRA

Conclusions

- ISAs were performed to identify accidents and IROFS, not to produce accurate estimate of risk
- NRC staff has concluded that the ISAs are acceptable for compliance
- Some ISAs have used PRA methods extensively; and other ISAs have used them selectively, as recommended in NRC guidance

Conclusions (cont'd)



- Example in Section V shows why it often will be feasible for NRC staff to perform quantitative risk significance evaluation for each inspection finding at the time the deficiency is found
 - Usually only one process
 - Few accident sequences
- For ISAs, it is not necessary to pre-evaluate the frequencies of all accident sequences in all processes
 - Based on analysis of previous inspection findings, only a few of them would require such quantitative significance evaluations each year

Questions