



POTENTIAL USE OF DESIGN FEATURES TO COMPLY WITH THE REGULATORY REQUIREMENTS OF 10 CFR PART 70

Public Meeting
August 17, 2011

CATEGORY 2 MEETING

- The primary discussions are expected to be between the NRC, NEI and representatives of licensed fuel cycle facilities. Members of the public will be invited to participate in this meeting at designated points on the agenda.

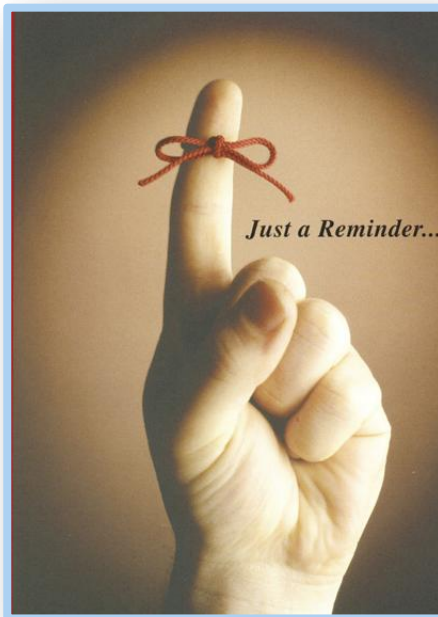


REMINDERS

- For participants at the table, if you want to contribute to the discussion, please get my attention by standing your name tent on its side. For those of you away from the table, if you just raise your hand I'll get to you in order.
- Make sure we keep background noise down to a minimum. You can also help cut down background noise by turning off or silencing your cell phones or other electronic devices for the duration of the workshop.
- Please take a moment to complete the public meeting feedback forms and let us know what you think.
- Restrooms are just outside the glass doors, past the guard station and to your left.

REMINDERS (CONT'D)

- The information contained herein is for discussion purposes only and does not represent the final NRC position.



AGENDA

- Opening Remarks (NRC, NEI)
- Design Features & Bounding Assumptions Discussion (NEI)
- Break
- Path Forward
- Questions/Closing Remarks
- Adjourn

ROUNDTABLE INTRODUCTION



OPENING REMARKS



Use of Design Features by Fuel Facilities to Meet NRC Requirements

**Facility Representatives
NEI Representatives
August 17, 2011
NRC Public Meeting**

10 CFR Part 70

- 70.62(e) - Each engineered or administrative control or control system necessary to comply with paragraphs (b), (c), or (d) of this section shall be designated as an item relied on for safety....
- 70.61(b) - The risk of each credible high-consequence event must be limited....
- 70.61(c) - The risk of each credible intermediate-consequence event must be limited....
- 70.61(d) - ...the risk of nuclear criticality accidents must be limited by assuring that under normal and credible abnormal conditions...

Controls for credible accidents are IROFS

What is a Control?

- **Control/Control System – Engineered systems or administrative controls designed to prevent the causes or mitigate the consequences of deviations (e.g. process alarms, interlocks, procedures)**

[AICHE Guidelines for Hazards Evaluations Procedures, pg. 133, referenced in NUREG-1513]

An Acceptable Quality of Not Credible

- A process deviation consists of a sequence of many unlikely events or errors for which there is no reason or motive. (NUREG-1520, pg. 3-27)

**NUREG-1520 acceptable quality for
defining event as “Not Credible”**

Design Features as Defined by Industry

(Bullet 2 modified since NEI June 2011 letter to NRC –previous language in brackets)

- **Passive engineered features of the facility/process configuration that have insignificant possibility of failure, the safety aspect is not easily altered, is not subject to routine replacement, is not subject to degradation and do not require periodic testing or verification to ensure they remain available and reliable to perform their intended function.**
- **The **change** [only credible] mechanism by which these features **are allowed to** [could] be altered is through a formal design **process** [change] performed under a configuration control program. Design features are subject to change control under configuration management (70.72), and are documented in the ISA.**

Designation of Design Features as IROFS not Appropriate

- ISA provides process to identify high priority safety items as IROFS
- Designation of all safety items as IROFS dilutes distinction for most safety significant items; worker training less effective
- Graded approach to configuration management maintains safety margin

NUREGs-1520 & -1513 support approach

70.72 Change Process

- **70.72 Clearly requires licensees to evaluate every facility change that could impact safety; Not limited to IROFS**
- **Licensees implement 70.72 through a disciplined process**
- **Licensee program performance to commitments + NRC inspections verify compliance**

Examples of Design Features

Accident Sequence Dependent

- Most installation dimensions, e.g., space between vessels
- Passive favorable geometry tanks & piping
- Funnel break or break tank between process vessels
- Floors in process buildings
- Buildings designed to withstand a “Highly Unlikely” natural phenomena event

Examples of What Is Not a Design Feature

Accident Sequence Dependent

- **Calcliner tube (10-inch ID 0.5 inch Wall)**
- **Slab tanks**
- **Process off-gas pipe containing gasses including HF**
- **Cartridge filter used to minimize SNM solids in down stream processes**
- **Filter press**

Conclusion

- Existing regulatory framework supports the use of design features
- Revisions to NUREG-1520 would provide further clarification aiding consistency in implementation [NEI letter dated June 7, 2011]

BACKUP SLIDES

Part 70, Appendix A, Reporting Requirement

Item (b)(1) states:

- **(b) Twenty-four hour reports. Events to be reported to the NRC Operations Center within 24 hours of discovery, supplemented with the information in 10 CFR 70.50(c)(1) as it becomes available, followed by a written report within 30 days:**
 - **(1) Any event or condition that results in the facility being in a state that was not analyzed, was improperly analyzed, or is different from that analyzed in the Integrated Safety Analysis, and which results in failure to meet the performance requirements of § 70.61.**

Plant Specific Example of Design Features, Initial Conditions and Bounding Assumptions



Another Design Features Example



Another Design Features Example



Not a Design Feature



Break

Path Forward

Questions/Closing Remarks

*Thank
You*

Supporting Slides

Index

- **Regulatory Requirements**
- **Reliability of Passive Features**
- **Engineered Control and Design Features**
Proposed Definition
- **References**



Regulatory Requirements

- **10 CFR Part 21.3, Definitions (Reporting of Defects and Non Compliance)**
- **10 CFR Part 70.22, Contents of Application**
- 10 CFR Part 70.23, Requirements for Approval of Application
- 10 CFR Part 70.50, Reporting Requirements
- **10 CFR Part 70.55, Inspections**
- 10 CFR Part 70.61, Performance Requirements
- 10 CFR Part 70.65, Additional Content of Applications
- 10 CFR Part 70.72, Facility Changes and Change Process



10 CFR Part 21.3

- A defect in a design feature could create a substantial safety hazard, therefore it should be considered a basic component.
 - 21.3 (3) When applied to other facilities and other activities licensed under 10 CFR parts 30, 40, 50 (other than nuclear power plants), 60, 61, 63, 70, 71, or 72 of this chapter, basic component **means a structure, system, or component, or part thereof**, that affects their safety function, that is directly procured by the licensee of a facility or activity subject to the regulations in this part and **in which a defect or failure to comply with any applicable regulation in this chapter, order, or license issued by the Commission could create a substantial safety hazard.**
 - *See also commercial grade item definition.*

10 CFR PART 70.22



- *70.22(a)(7) Each application for a license shall contain a description of equipment and facilities which will be used by the applicant to protect health and minimize danger to life or property (such as handling devices, working areas, shields, measuring and monitoring instruments, devices for the disposal of radioactive effluents and wastes, storage facilities, criticality accident alarm systems, etc.);*



10 CFR PART 70.23

- 70.23 (a)(3) The applicant's proposed equipment and facilities are adequate to protect health and minimize danger to life or property.



10 CFR PART 70.50

- 70.50(b)(2) *Twenty-four hour report*. Each licensee shall notify the NRC within 24 hours after the discovery of an event in which equipment is disabled or fails to function as designated when:
 - (i) The equipment is required by regulation or licensee condition to prevent releases exceeding regulatory limits, to prevent exposures to radiation and radioactive materials exceeding regulatory limits, or to mitigate the consequences of an accident;
 - (ii) The equipment is required to be available and operable when it is disabled or fails to function; and
 - (iii) No redundant equipment is available and operable to perform the required safety function.



10 CFR PART 70.52

- **70.52 (a) Reports of Accidental Criticality.** Each licensee shall notify the NRC Operations Center¹ within one hour after discovery of any case of accidental criticality.



10 CFR PART 70.55

- 70.55 (a) Inspections. Each licensee shall afford to the Commission at all reasonable times opportunity to inspect special nuclear material and the premises and facilities wherein special nuclear material is used, produced, or stored.

10 CFR PART 70.61



■ Performance requirements

- 70.61 (b) The risk of each credible high-consequence event must be limited. **Engineered controls, administrative controls, or both, shall be applied** to the extent needed to reduce the likelihood of occurrence of the event so that, upon implementation of such controls, the event is highly unlikely or its consequences are less severe than those in paragraphs 70.61 (b)(1)-(4).
- 70.61 (c) The risk of each credible intermediate-consequence event must be limited. **Engineered controls, administrative controls, or both shall be applied** to the extent needed so that, upon implementation of such controls, the event is unlikely or its consequences are less than those in paragraphs (c)(1)-(4) of this section.
- 70.61 (d) In addition to complying with paragraphs (b) and (c) of this section, **the risk of nuclear criticality accidents must be limited** by assuring that under normal and credible abnormal conditions, all nuclear processes are subcritical...
- (e) **Each engineered or administrative control or control system necessary to comply with paragraphs (b), (c), or (d) of this section shall be designated as an item relied on for safety.** The safety program, established and maintained pursuant to § 70.62 of this subpart, shall ensure that each item relied on for safety will be available and reliable to perform its intended function when needed and in the context of the performance requirements of this section.



10 CFR PART 70.65

- 70.65 (b)(2) The integrated safety analysis (ISA) summary must contain a general description of the facility with emphasis on those areas that could affect safety, including an identification of the controlled area boundaries.
- 70.65(b)(3) The ISA Summary must contain a description of each process (defined as a single reasonably simple integrated unit operation within an overall production line) analyzed in the integrated safety analysis in sufficient detail to understand the theory of operation; and, for each process, the hazards that were identified in the integrated safety analysis pursuant to § 70.62(c)(1)(i)-(iii) and a general description of the types of accident sequences;
- 70.65(b)(9) A description of the definitions of unlikely, highly unlikely, and credible as used in the evaluations in the integrated safety analysis.



10 CFR PART 70.72

- 70.72 (a) The licensee shall establish a configuration management system to evaluate, implement, and track each change to the site, structures, processes, systems, equipment, components, computer programs, and activities of personnel.
- 70.72 (b) Any change to site, structures, processes, systems, equipment, components, computer programs, and activities of personnel must be evaluated by the licensee as specified in 70.72 (a), before the change is implemented. The evaluation of the change must determine, before the change is implemented, if an amendment to the license is required to be submitted in accordance with § 70.34.



RELIABILITY OF PASSIVE FEATURES

- Some potential causes of failure of active systems, such as lack of human action or power failure, do not exist when passive safety is provided.
- However, it is important to note that passive devices remain subject to other kinds of failure, such as:
 - Stress Corrosion Cracking
 - Fatigue (thermal or vibration)
 - Flow Assisted Degradation
 - Local Corrosion Mechanism
 - Willful human interference
- Passive safety **is not** synonymous with inherent safety or absolute reliability.
- Therefore, we can not assume that any passive feature is going to be reliable and available to make a particular event not credible **without proper analysis and justification.**

References:

- NUREG/CR-6936
- IAEA-TECDOC-626

PROPOSED DEFINITIONS BY NRC STAFF DURING APRIL 11 PUBLIC MEETING

- Engineered Control—engineered controls are active or passive devices used to control a process variable (or dynamic process parameter) (e.g. Flow, Pressure, Temperature, Level, Time, Composition, pH, viscosity, etc...).
- Engineered controls used to reduce the risk of credible events must be designated as IROFS to meet the performance requirements of 10 CFR Part 70.61.
- Design features—are passive safety features used to eliminate a particular hazard through the fundamental conceptual design choices made for the facility. The safety function is accomplished by a fundamental property of the design (e.g. construction of material, geometry, etc...). If a design feature is altered or modified, it could have a significant effect on safe operation (e.g. vessels, containers).



REFERENCES



NEI Correspondence

- Letter from J. Schlueter, NEI, to M. Bailey, NRC (June 7, 2011). “Industry Comments Relevant to April 11, 2011 Public Meeting on Proposed Staff Approach for the Use of Design Features to Meet Part 70 Regulatory Requirements.” ADAMS Accession Number ML111870539.
- Letter from J. Schlueter, NEI, to D. Dorman, NRC (June 10, 2010). “Feedback on April 27, 2010, Public on Design Features and Suggested Path Forward.” ADAMS Accession Number ML101670267.
- Letter from J. Schlueter, NEI, to D. Dorman, NRC (January 22, 2010). “Industry Consensus Paper and Second Public Meeting on Design Features.” ADAMS Accession Number ML100360227.

NRC Correspondence

- Letter from M. Bailey, NRC, to J. Schlueter, NEI (June 20, 2011). “Acknowledgement Letter to Confirm Receipt of June 7, 2011, NEI Letter on Design Features” ADAMS Accession Number ML111640525.
- Letter from D. Dorman, NRC, to J. Schlueter, NEI (June 17, 2010). “Design Features Associated with the Integrated Safety Analysis” ADAMS Accession Number ML101450123.
- Letter from D. Dorman, NRC, to J. Schlueter, NEI (April 13, 2010). “Design Features Associated with the Integrated Safety Analysis” ADAMS Accession Number ML100810193.



REFERENCES (CONT'D)

Meeting Summaries

- Letter from C. Román, NRC, to L. Campbell, NRC (April 20, 2011). “April, 11, 2011, Meeting Summary to Discuss The Proposed Approach for the Use of Design Features to Meet the Regulatory Requirements of 10 CFR 70” ADAMS Accession Number ML111040199.
- Letter from P. Silva, NRC, to M. Bailey, NRC (June 28, 2010). “Summary of the June 28, 2010, Public Meeting to Discuss the Use of Design Features to Meet the Performance Requirements of Title 10 of the Code of Federal Regulations Part 70 Subpart H” ADAMS Accession Number ML101950377.
- Letter from M. Raddatz, NRC, to M. Bailey, NRC (March 26, 2010). “Summary of the March 11, 2010, Public Meeting to Discuss the Use of Design Features to Meet the Performance Requirements of Title 10 of the Code of Federal Regulations Part 70 Subpart H” ADAMS Accession Number ML100760086.