

IROFS Risk Ranking/Augmented QA



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Agenda

Part I – Open Session

- Objective
- Background
- Approach
- Risk ranking methodology
- Augmented Quality Assurance
- Licensing document clarifications

Part II - Closed Session

- Risk ranking examples

Part I
Open Session
Risk Ranking Process/Augmented QA

Objective

- Describe approach that ensures that the most important IROFS are identified and priorities/controls are applied consistent with safety significance
- Describe the MOX Services approach to augmented QA for low risk IROFS (MPQAP Section 2.2.3.C)

Background

- Item Relied on for Safety (IROFS)
 - Each engineered or administrative control or control system necessary to comply with paragraphs (b), (c), or (d) of this section shall be designated an item relied on for safety [10CFR70.61(e)]

Background

- Quality Assurance
 - Application for ... plutonium processing and fuel fabrication facility shall contain... a description of the quality assurance program
 - Include discussion of how the criteria of 10CFR50 Appendix B will be met [10CFR70.22(f)]
 - Acceptable option is commitment to implement and maintain its QA program to comply with applicable “requirements” of ASME-NQA-1-1994... [NUREG-1718, 15.1.4.3]

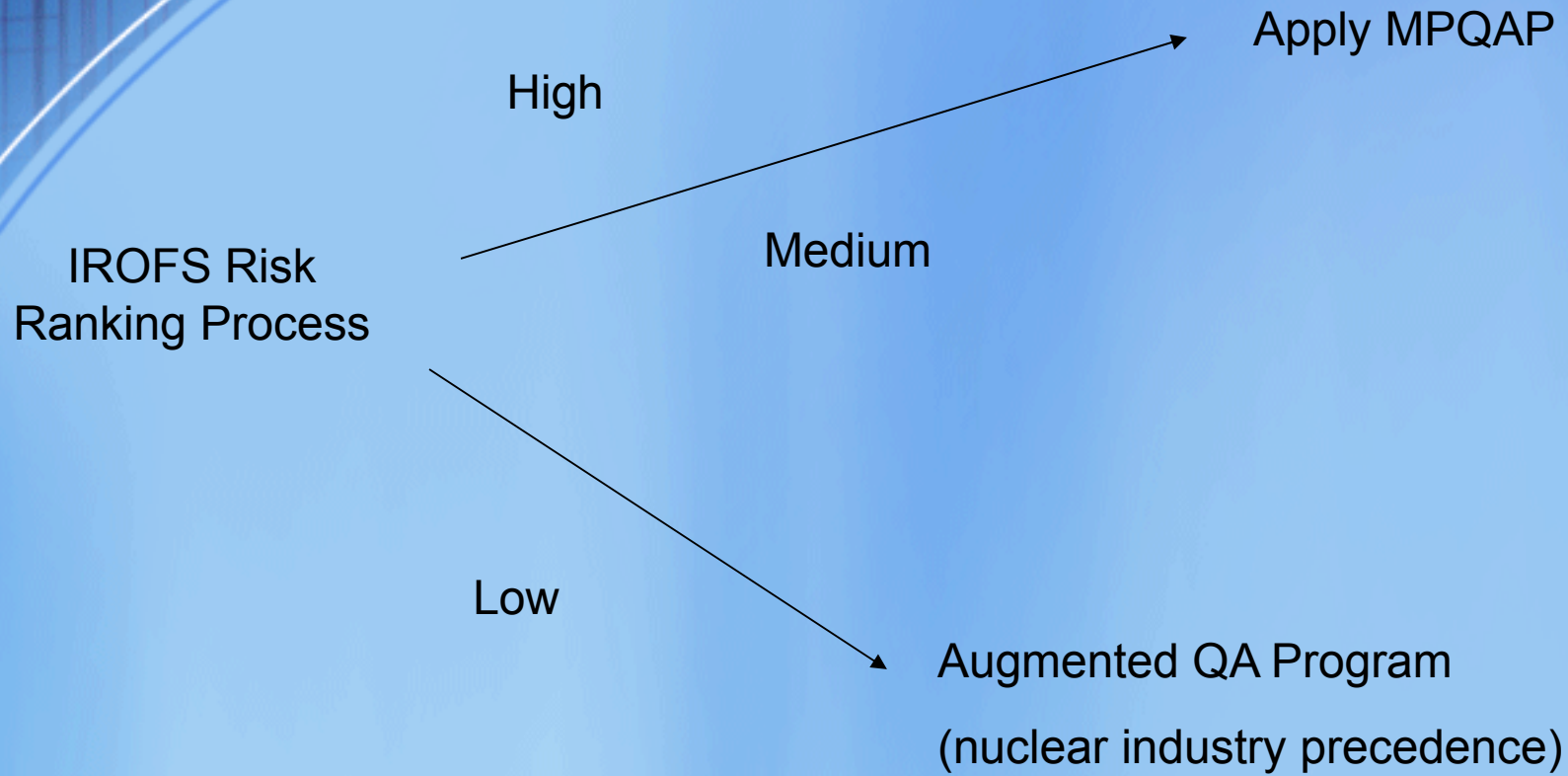
Background

- Quality Assurance
 - MOX Services has committed to NQA-1 [LA 15.1]
 - MOX Project Quality Assurance Plan
 - Provides discussion of how criteria of 10CFR50 Appendix B are met
 - Section 2.2.3 C discusses augmented QA programs for IROFS
 - Described in engineering procedures
 - Quality Assurance concurrence
 - Use must be justified
 - May rely on nuclear industry precedence
 - Provide NRC list of IROFS where augmented program is used

Background

- Advisory Committee on Reactor Safeguards
 - Without such [risk] rankings, licensees and regulatory bodies will find it challenging to apportion their resources for inspecting, monitoring, and maintaining IROFS in complex facilities. *[ACRS Letter on Comparison of ISA and PRA for Fuel Cycle Facilities, Feb 17, 2011]*

Approach



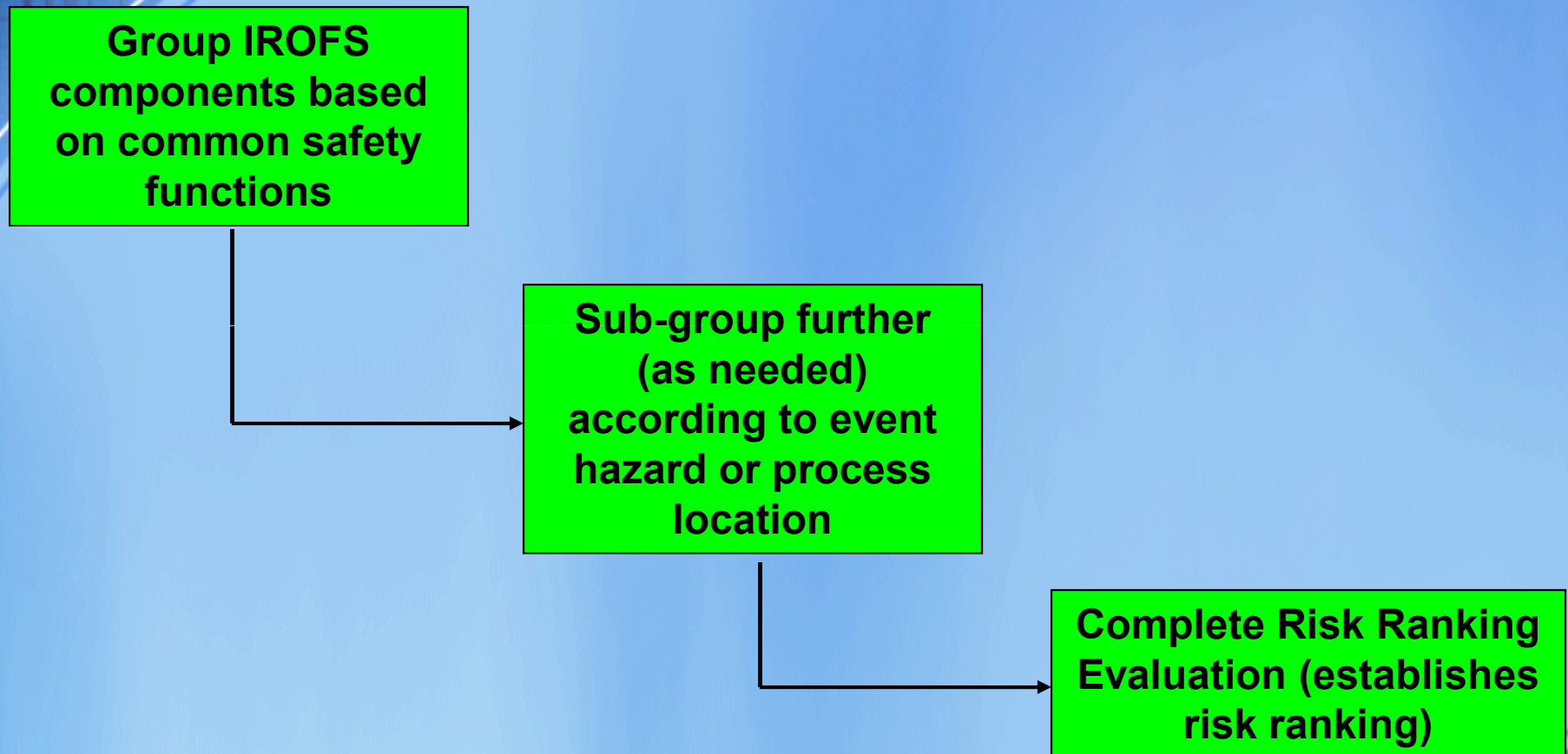
Risk Ranking

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Risk Ranking Process

- Purpose
 - Define relative importance of IROFS to the overall safety criteria
 - Identify the IROFS that are a priority for MOX Services focus
 - Identify low risk IROFS where augmented QA program could be applied

Risk Ranking Process



Risk Ranking Process

- Uses event sequences described in Integrated Safety Analysis Summary (ISAS)
- Risk Ranking Criteria groups
 - **Frequency** of the event sequence including IROFS failure
 - **Consequences** of event and IROFS failure

Risk Ranking Process

- **Frequency** criteria
 - Is failure detection provided for the IROFS?
 - Continuously verified with automatic system control
 - Continuously verified with alarm or warning
 - Continuously verified with no alarm or warning
 - Verifiable through periodic surveillance frequency
 - What is the likelihood of the initiating event?
 - Occurrence less than once in lifetime of facility
 - Occurrence approximately once in lifetime of facility
 - Occurrence approximately once per year
 - Occurrence approximately greater than once per year

Risk Ranking Process

- Frequency criteria (cont'd)
 - What is the complexity of the IROFS design?
 - Simple, reliable
 - More complicated but supported by some reliability data
 - Complex with little or no reliability data
 - How much safety margin is there between the process upset and the safety limit?
 - Low sensitivity, large margin to safety limit
 - Medium sensitivity, some margin to safety limit
 - High sensitivity, small margin to safety limit

Risk Ranking Process

- Consequence criteria
 - Does the IROFS control or monitor the process?
 - Monitoring function, failure does not cause event
 - Indirectly provides controlling function, failure does not cause event
 - Direct controlling function, failure may cause event
 - What is the severity of the event consequence?
 - Low dispersability, e.g., assemblies, liquids, low energy systems, low energy deflagrations
 - Medium dispersability, e.g., pellets, non-respirable powders
 - High dispersability, e.g., respirable powders, high energy systems, high energy detonations, criticality

Risk Ranking Process

- Consequence criteria (cont'd)
 - Is the event slow acting? How much time is there from the safety limit to unacceptable consequences?
 - Slow acting event, long time margin for response with upset condition identification
 - Medium acting event, less time for response or with indirect identification
 - Fast acting event, little or no time for response
 - Are other systems, normal or IROFS, available to provide additional safety?
 - Normal systems and other IROFS are immediately available to provide backup upon IROFS failure
 - Some systems are available, but may not be immediately available
 - Only normal or redundant, non-diverse IROFS available

Risk Ranking Process

RISK CATEGORY

- The sum of the four criteria in each group is evaluated for overall risk ranking of the IROFS control group by way of a risk matrix

Risk Chart		Frequency		
		Low	Medium	High
Consequence	High	Medium	High	High
	Medium	Low	Medium	High
	Low	Low	Low	Medium

Risk Ranking Process

- Status
 - Process implemented through project procedure
 - Evaluations have been performed to demonstrate process
 - Results compare favorably with other risk evaluation processes (e.g., PRA)
 - Will be integrated into change process



Augmented QA Program

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Nuclear Industry Precedent

- Regulatory Guide 1.176, *An Approach for Plant Specific, Risk Informed Decisionmaking: Graded Quality Assurance*
- Quality Assurance Program Description for the American Centrifuge Plant, Docket No. 70-7004, August 2004 (including NRC SER)
- LES License Amendment Request December 23, 2010, as approved by NRC
- 10CFR50.69 *Risk-informed Categorization and Treatment of Structures Systems and Components for Nuclear Power Reactors*

Nuclear Industry Precedent

- Regulatory Guide 1.189, *Fire Protection for Operating Nuclear Power Plants*
- Regulatory Guide 1.143, *Radioactive Waste Management Systems*
- Regulatory Guide 4.15, *Radiological Monitoring Programs*

Augmented QA Program

- Key Differences for Augmented QA Program
 - Procure commercial using national codes and standards
 - Increased use of over checks at receipt inspection (such as PMI)
 - 10CFR Part 21 invoked upon acceptance
 - Reduced sampling vs. normal sampling plans
 - Peer inspection by qualified personnel
 - Audit focus on high risk IROFS
 - QL-1LR established to uniquely identify low risk IROFS

Note: MOX Services will continue to use performance analysis and lessons learned to determine if changes to process approach are required.

Augmented QA Program

Note: The following MPQAP sections should require no reduction from existing MPQAP requirements for QL-1LR.

- Section 1 *Organization*
- Section 5 *Instructions, Procedures, or Drawings*
- Section 6 *Document Control*
- Section 8 *Identification & Control of Material, Parts or Components*
- Section 9 *Control of Special Processes*
- Section 11 *Test Control*
- Section 12 *Control of Measuring & Test Equipment*
- Section 13 *Handling, Storage and Shipping*
- Section 14 *Inspection Test and Operating Status*
- Section 15 *Nonconformance Materials, Parts or Components*
- Section 16 *Corrective Action*
- Section 17 *Quality Assurance Records*

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MOX Procedure Changes

- *PP1-1, Quality Assurance Grading*
- *PP3-7, Audits*
- *PP3-12, Supplier Evaluation*
- *PP8-3, Evaluation and Reporting of Defects and Noncompliance*
- *PP9-1, SSC Quality Levels & Marking Design Documents*
- *PP9-9, Engineering Specifications*

Licensing Document Clarifications

- License Application
 - Chapter 5 – include description of risk ranking process
 - Chapter 15 – include discussion of use of risk ranking process to support use of augmented QA program for low risk IROFS
- MPQAP
 - Update 2.2.3 C to include use of risk ranking process to support the use of augmented QA program (details on augmented program in MOX Services Project Procedure PP9-1, *SSC Quality Levels & Marking Design Documents*)

Summary

- Established process to prioritize IROFS using risk insights
 - Identifies high risk and low risk IROFS
 - MPQAP for high risk IROFS
 - Implement MPQAP 2.2.3 C for low risk IROFS
 - Engineering procedures
 - Nuclear industry precedence

Part II
Closed Session
Risk Ranking Process Examples