#### SAFETY ANALYSES FOR RESEARCH REACTORS SAFETY CLASSIFICATION PROCESS

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NATIONAL CENTRE FOR NUCLEAR RESEARCH ŚWIERK Safety Classification of Structures, Systems and Components in Nuclear Power Plants (IAEA SSG-30)

Purpose:

Describes required performance for safety

# **Drives:**

# Design > Manufacturing > Installation > Commissioning > Operation & Maintenance



#### Polish Atomic Law requirements

Safety class should consider:

- Delivered safety function
- Failure consequence (safety function)
- Failure consequence (new initiating events)
- Probability of being required to deliver safety function



# **Risk definition**

	Hazard Categories				
I Catastrophic	II Critical	III Marginal	IV Negligible		
1A	2 <b>A</b>	3A	4A		
1B	2B	3B	4B		
1C	2C	3C	4C		
1D	2D	3D	4D		
1E	2E	3E	4E		
	1   1A   1B   1C   1D   1E	IIICatastrophicCritical1A2A1B2B1C2C1D2D1E2E	IIIIIICatastrophicCriticalMarginal1A2A3A1B2B3B1C2C3C1D2D3D1E2E3E		

NASA-STD-8719.7 January 1998

#### HAZARD RISK INDEX MATRIX

VS

Hazard Risk Index	Severity - Probability	Suggested Criteria
1	1A, 1B, 1C, 2A, 2B, 3A	Unacceptable
2	1D, 2C, 2D, 3B, 3C	Undesirable (Management Decision Required)
3	1E, 2E, 3D, 3E, 4A, 4B	Acceptable with Review by Management
4	4C, 4D, 4E	Acceptable without Review Based Upon: NHB 1700.1 V1B)

Hazard Risk Index Matrix





# The procedure

Categorization of safety functions

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- Assign SSC to safety functions
- Apply modifiers to classes
- Category > Class



### Probability modifier



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#### ONR guide NS-TAST-GD-094

CATEGORISATION OF SAFETY FUNCTIONS AND CLASSIFICATION OF STRUCTURES, SYSTEMS AND COMPONENTS

- Emphasis on severity
- Following SSG-30





# Safety function demand frequency

Saphire inputs:

- Sequences
- Reliability relationship
- Failure data (IAEA, NRC)



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# Further work

Industry database vs internal data:

- Time to failure data
- Survivor data
- Failure rate vs time investigation
- Degradation data analysis







# Thank you jacek.kalowski@ncbj.gov.pl



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