

# **International Workshop: Kiev, Ukraine**

## **Use of Probabilistic Safety Analysis in Operation of Nuclear Power Plants and Regulatory Decision Making**

### **Program**



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**Licensing Section**

**Probabilistic Safety Assessment Branch**

**U.S. Nuclear Regulatory Commission**

# Safety Goals

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## ◆ Qualitative

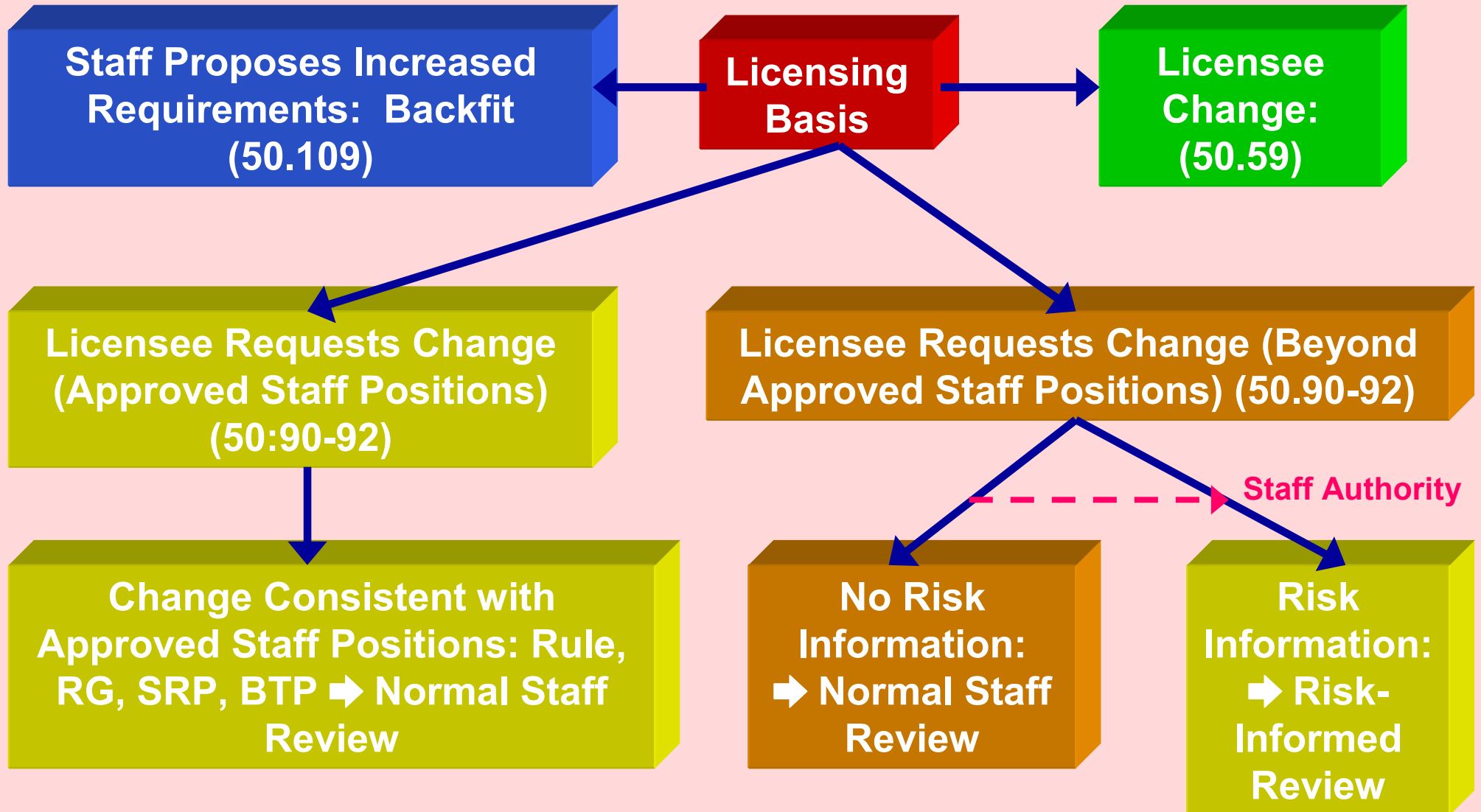
- Individual Consequences of Nuclear Plant Operation Bear No Significant Additional Risk
- Societal Risks  $\leq$  Those from Other Forms Electrical Generation and Not a Significant Addition

## ◆ Quantitative

- Risk of Prompt Fatalities within 1 mile  $\leq 0.1\%$  Sum from Other Accidents
- Risk of Cancer Fatalities within 10 miles  $\leq 0.1\%$  Sum from All Other Causes

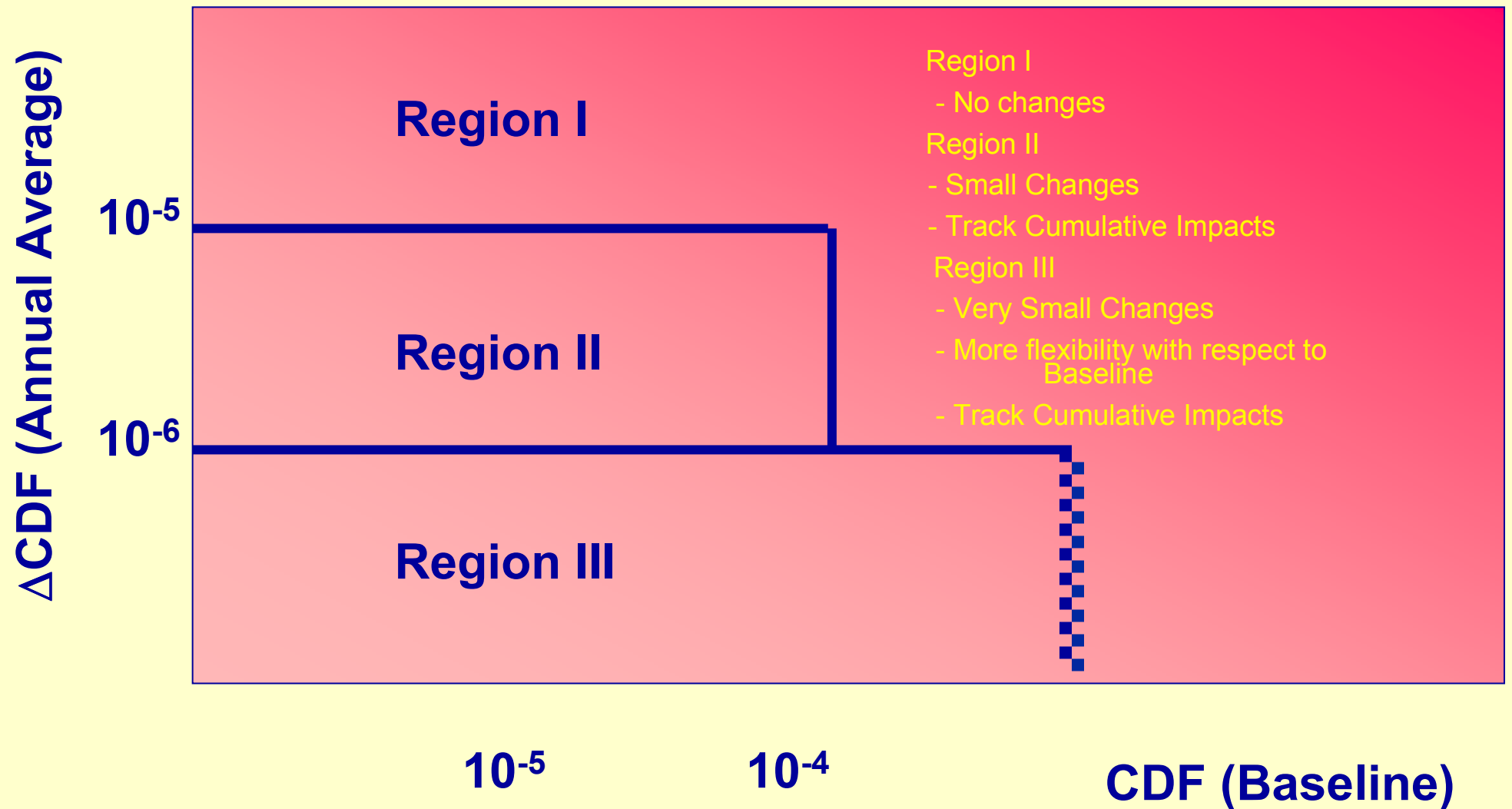
## ◆ No Fatality Acceptable

# Decision Logic: Licensing Basis Changes

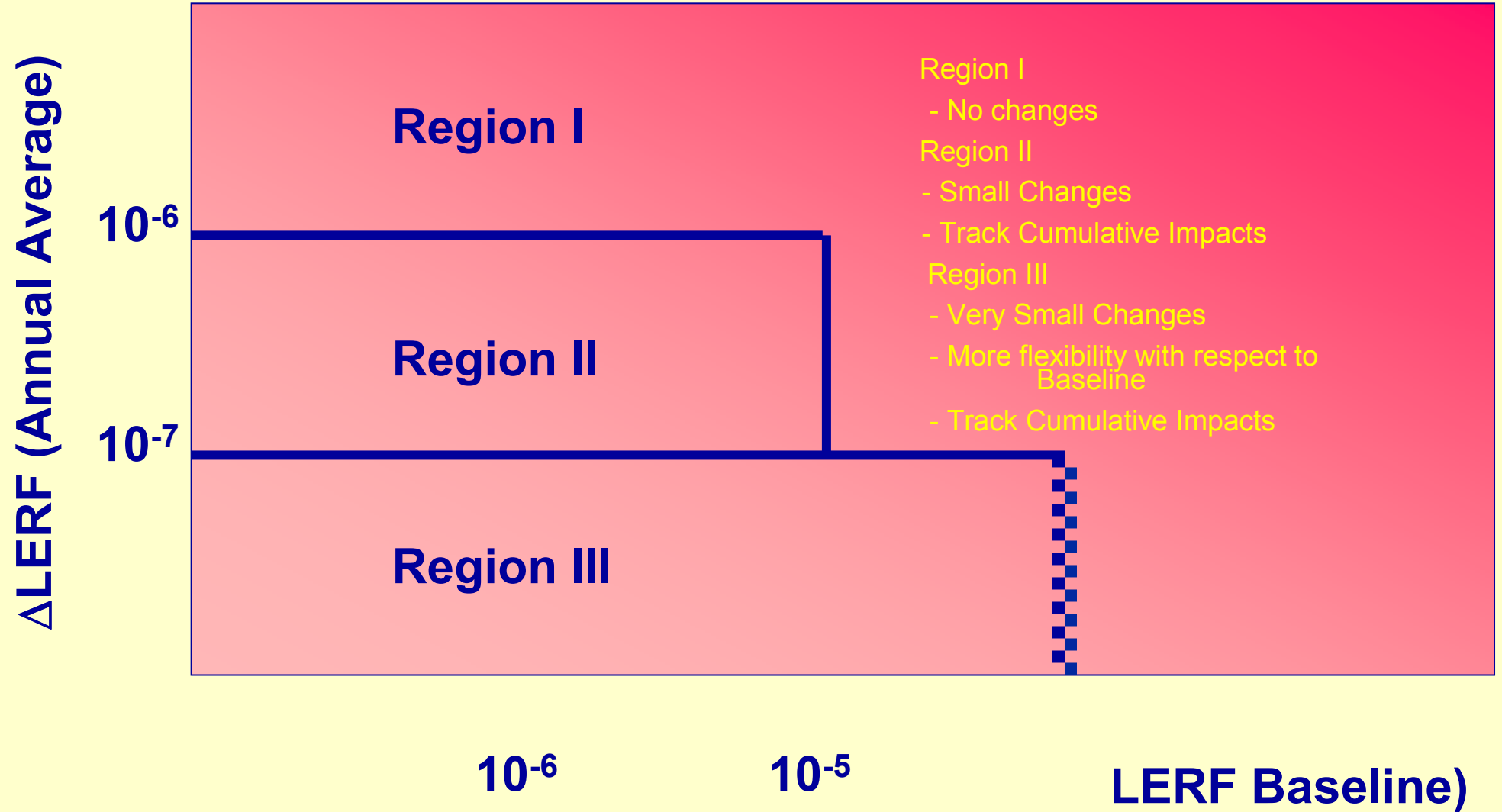


# Risk-Informed Guidance

	<b>Regulatory Guides: Guidance to Licensees</b>	<b>Standard Review Plan: Guidance to NRC Staff</b>
<b>General</b>	<b>RG 1.174</b>	<b>SRP Chapt.19, Rev P</b>
<b>IST</b>	<b>RG 1.175</b>	<b>SRP Section 3.9.7</b>
<b>GQA</b>	<b>RG 1.176</b>	<b>GQA Inspection Guidance</b>
<b>TS</b>	<b>RG 1.177</b>	<b>SRP Section 16.1</b>
<b>ISI</b>	<b>RG 1.178</b>	<b>SRP Section 3.9.8</b>
<b>PSA Quality</b>	<b>RG 1.200</b>	

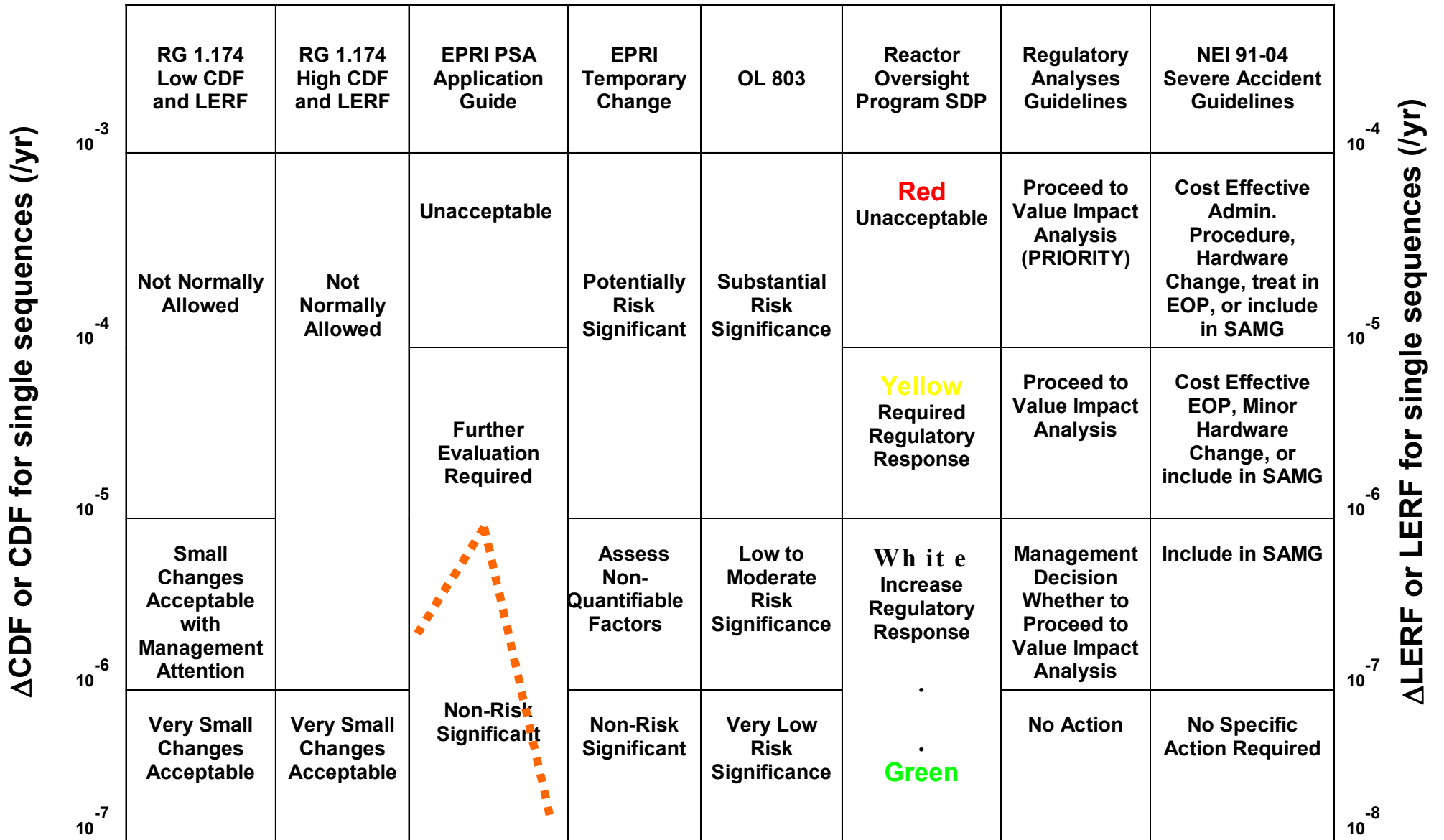


## Acceptance Guidelines for Core Damage Frequency



## Acceptance Guidelines for Large Early Release Frequency

# Use of Risk Information in NRC and Industry Programs



# PSA Quality: Anticipated Approach

Phase	Scope	Standard	Regulatory Guide(s)	Priority
1	For App	No	Yes, See Slide 16	Discuss
2	For App	Yes	Yes	
3	Full	Yes	Yes	
4	State of Art	Yes	Yes	
Proof of Concept	Full	As Available		

# PSA Quality

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- ◆ **High Quality PSA [& Safety Monitor]**
  - Level 1 & 2; Internal & External Events
    - » Fire, Flood, Seismic, Severe Weather, Transport
  - Power, Transition, Shutdown (All Modes)
  - Level 3 (additional goal)
- ◆ **Meets a Standard**
- ◆ **Living, Maintained**
- ◆ **Higher Quality  Increased Flexibility**

# PSA Quality Verification

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- ◆ **Owners' Group Cross Comparison**
- ◆ **Industry Certification**
- ◆ **Standards**
  - **ASME: Level 1, Level 2, Internal Events**
  - **ANS: Shutdown, External Events**
  - **ANS: Fire Protection**
- ◆ **NRC Staff Assessment**
- ◆ **SDP Phase 2 Notebook & SPAR Benchmark**

# Licensee Program

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- ◆ **Formal Process**
- ◆ **Evaluate Circumstances, Configuration; Make Decision**
  - **Appropriate Management Leadership**
  - **Criteria Levels**
  - **Expert Panel**
  - **Compensatory Measures**
- ◆ **Performance Indicator(s)**