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**Westinghouse Electric Company  
CE Nuclear Power LLC**

**RISA LICENSING STRATEGY**

**July 25, 2000**

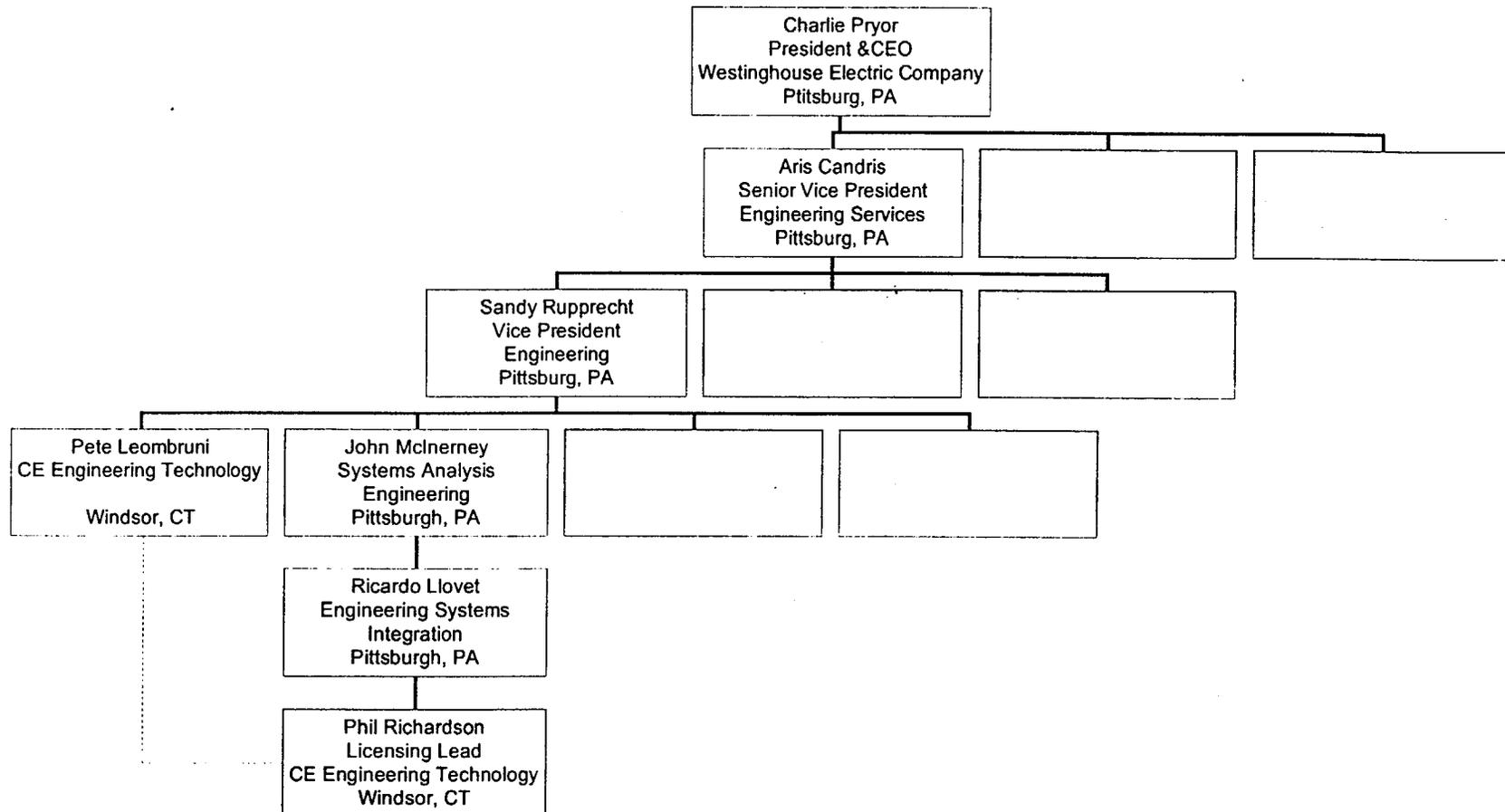
# Agenda

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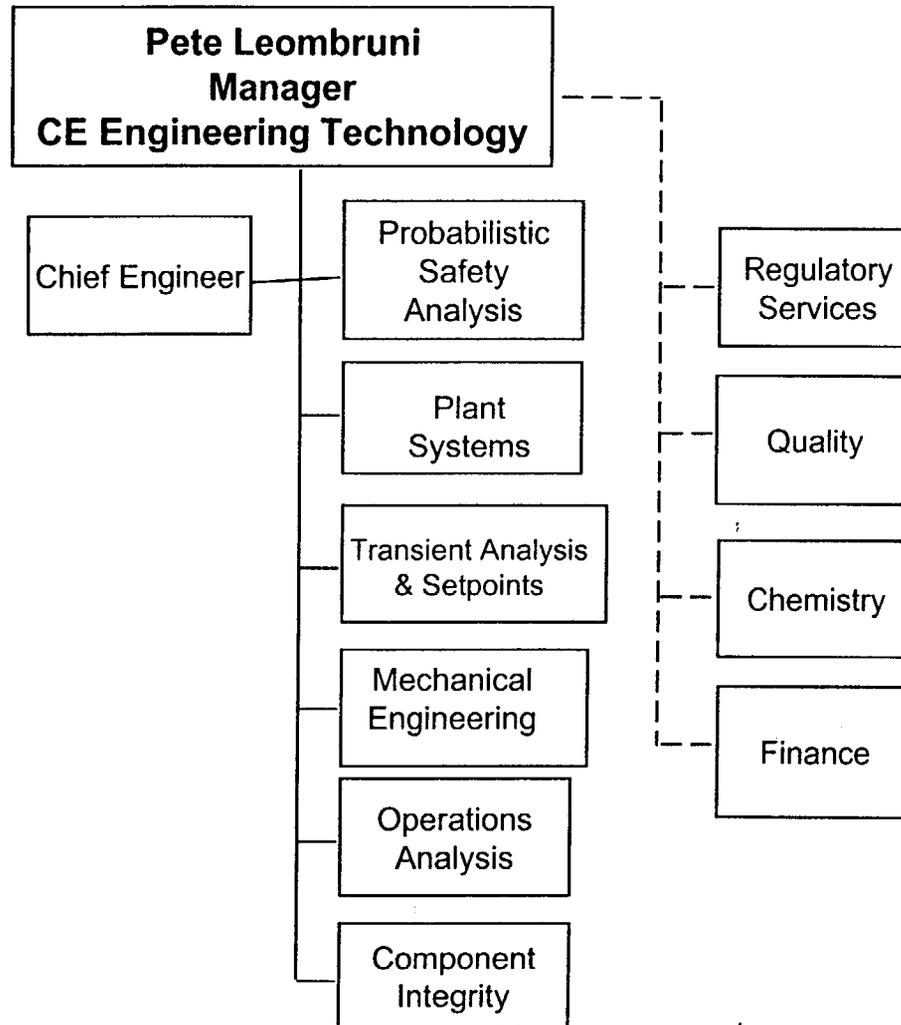
- **Organization**
  - **Westinghouse / CE Nuclear Power LLC**
- **Background**
  - **Regulatory / Industry Basis**
  - **RISA Experience**
- **Risk-Informed Safety Analysis Project**
  - **RISA - What It Is / What It Is Not**
  - **Technical Approach**
  - **Licensing Approach**
- **RISA Benefits**
- **Anticipated Schedule**
- **Conclusion**



# Organization



# Organization



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# **Risk Informed Safety Analysis**

**Bob Jaquith**



# Regulatory and Industry Basis for RISA

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- **Rev. 2 of the SAR guide (Reg. Guide 1.70 “Standard Format and Content of SARs for Nuclear Power Plants) suggests RISA.**
- **ANSI Standard, ANS-51.1-1983; R1988, suggests five frequency categories roughly equivalent to Moderately Frequent, Infrequent, and Limiting Faults I, II, and III.**



# **C-E Experience in use of RISA**

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- **C-E initially performed the complete safety analyses for two plant designs using RISA approach.**
  - **Although supportive, the NRC reaction at the time was that Staff reviewers could not provide a timely review and that licensing delays would likely be incurred. Consequently, SARs were withdrawn and replaced by traditional deterministically based SARs.**
- **Now that NRC and the Industry have people trained in risk assessment methods, it is a good time to reassess the RISA methods/approach and determine how they can be best applied for reshaping existing safety analyses**



# **Risk Informed Safety Analysis (RISA) Project and Licensing Approach**

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- **The CEORG RISA effort includes three (3) phases:**
  - **Phase 1 - Present the overall concept to NRC personnel to assess receptivity to RISA.**
  - **Phase 2 - Write a methodology Topical Report and submit for NRC review and approval.**
  - **Phase 3 - Provide plant specific RISA implementation for all or selected transients.**

# Initial Effort

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- **Initial effort:**
  - **Development of a Topical Report (i.e., a methodology guide) which describes the concepts and provides a road map for application.**
- **Methodology:**
  - **Classification of event and acceptance criteria by event frequency, and**
  - **Consideration of assumptions and input values based on risk and physical limitations**
- **Product:**
  - **A user guide for RISA.**



## EVOLUTION OF INCIDENT CATEGORIZATION

10 CFR	ANSI N18.2	REG. GUIDE 1.70 (REV. 2)
NORMAL OPERATION	C.I NORMAL OPERATION	
ANTICIPATED OPERATIONAL OCCURRENCES	C.II MODERATE FREQUENCY “---MAY OCCUR DURING A CALENDAR YEAR---“	MODERATE FREQUENCY
“---ARE EXPECTED TO OCCUR ONE OR MORE TIMES DURING THE LIFE---“	C.III INFREQUENT INCIDENTS “---MAY OCCUR DURING A LIFETIME---“	INFREQUENT
ACCIDENTS	C.IV LIMITING FAULTS	LIMITING FAULTS
“---EXCEEDINGLY LOW PROBABILITY OF OCCURRENCE---“	“---NOT EXPECTED TO OCCUR BUT ARE POSTULATED---“	

EVOLUTION OF CATEGORY RADIOLOGICAL CRITERIA

10 CFR	ANSI N18.2	SECTION 15 STANDARD REVIEW PLANS
<p>ANTICIPATED OPERATIONAL OCCURRENCES</p> <ul style="list-style-type: none"> <li>SPECIFIED ACCEPTABLE FUEL DESIGN LIMITS ARE NOT EXCEEDED</li> </ul>	<p>MODERATE FREQUENCY</p> <ul style="list-style-type: none"> <li>10CFR 20 P.20.1</li> <li>NO LOSS OF FUNCTION OF ANY BARRIER TO RADIOACTIVE PRODUCT ESCAPE</li> </ul> <p>INFREQUENT INCIDENTS</p> <ul style="list-style-type: none"> <li>&gt;10CFR 20</li> <li>DAMAGE TO SMALL FRACTION OF FUEL ELEMENTS</li> </ul>	<p>MODERATE FREQUENCY</p> <ul style="list-style-type: none"> <li>SPECIFIED ACCEPTABLE FUEL DESIGN LIMITS ARE NOT EXCEEDED</li> </ul> <p>INFREQUENT</p> <ul style="list-style-type: none"> <li>INCIDENT DEPENDENT</li> </ul>
<p>ACCIDENTS</p> <ul style="list-style-type: none"> <li>10CFR100</li> </ul>	<p>LIMITING FAULTS</p> <ul style="list-style-type: none"> <li>10CFR100</li> </ul>	<p>LIMITING FAULTS</p> <ul style="list-style-type: none"> <li>A) SMALL FRACTION OF 10CFR100</li> <li>B) WELL WITHIN 10CFR100</li> <li>C) UP TO 10CFR100</li> </ul>



## CATEGORIZATION MATRIX

TYPE	INCIDENTS OF MODERATE FREQUENCY	INFREQUENT EVENTS	LIMITING FAULTS		
			LF-1	LF-2	LF-3
			INCIDENTS NOT LIKELY TO OCCUR  (SMALL FRACTION)	INCIDENTS OF LOW PROBABILITY  (WELL WITHIN)	INCIDENTS OF EXCEEDINGLY LOW PROBABILITY  (UP TO 10CFR 100)
1					
2					
3					
4					
5					
6					
7					
8					

# Events for Consideration

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	<u>FREQ. CAT.</u>
• <b>Initiating Event (IE)</b>	<b>N</b>
• <b>IE + Single Failure (SF)</b>	<b>N+1</b>
• <b>IE + Coincident Occurrences (CO)</b>	<b>N+1</b>
– <b>LOOP on Turbine Trip</b>	
– <b>Stuck CEA</b>	
– <b>Iodine Spike(s)</b>	
– <b>TS SG Tube Leakage</b>	
• <b>IE + SF + CO</b>	<b>N+2</b>
• <b>Other Parameters will also be considered</b>	

## CATEGORIZATION FREQUENCIES AND RADIOLOGICAL CRITERIA

10CFR	AOO		ACCIDENTS		
REG. GUIDE 1.70 (REV. 2) AND SRP	INCIDENTS OF MODERATE FREQUENCY	INFREQUENT EVENTS	LIMITING FAULTS		
			INCIDENTS NOT LIKELY TO OCCUR  (SMALL FRACTION)	INCIDENTS OF LOW PROBABILITY  (WELL WITHIN)	INCIDENTS OF EXCEEDINGLY LOW PROBABILITY  (UP TO 10CFR 100)
FREQUENCY (EVENTS PER REACTOR YEAR)	$\geq$ TBD	TBD – TBD	TBD – TBD	TBD – TBD	TBD – TBD
CRITERIA	TBD  DNBR $\geq$ **	TBD  DNBR $\geq$ TBD	TBD% of 10CFR 100	TBD% of 10CFR 100	TBD% of CFR 100

\*\* CORRESPONDING TO NO DEPARTURE FROM NUCLEATE BOILING CONDITION AT 95% PROBABILITY WITH A 95% CONFIDENCE LEVEL



# Potential Areas for RISA Application

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- **Rationalize Non-LOCA Safety Analysis**
- **Invoke LBB to Focus LOCA analyses on “credible” break sizes**
- **Rationalize Technical Specifications to reflect real operational issues and risks**



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# **Benefits Derived From Using Risk Informed Safety Analysis**

**Chuck Molnar**

# **Overall Benefits from RISA**

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- **Increased margin to safety analysis acceptance criteria**
- **Puts accident analyses in proper perspective**
- **Focuses Licensee/NRC/Vendor resources on important (risk significant) accident analyses**
- **Improves Licensee/NRC/Vendor understanding of accident analysis parameters**
- **Increases operating margin, reduce operator burden**
- **Streamlines safety analysis process**

**— Improves Safety —**



# Plant Specific RISA Benefits

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- **Highly Plant Specific**

- **Margin utilization will vary with each licensee depending on their particular need/focus**

- **Potential Margin Utilization**

- **Relaxation of Environmental Qualification envelope.**
- **Relaxation of Technical Specification Action Times, Surveillance Requirements, Allowed Outage Time, Setpoints, etc.**
- **Relaxation of Maintenance Requirements**
- **Reduced Outage Times**
- **Relaxation of dose requirements via event frequency reclassification**

- **Overall Enhancement of Operational Flexibility**

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# Anticipated Schedule

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<u>Activity</u>	<u>Completion</u>
- <u>Phase 1</u>	
- NRC kick-off meeting	July, 2000
- Solidify generic RISA methodology implementation concept	December, 2000
- <u>Phase 2</u>	
- Prepare and submit Topical Report	June, 2001
- NRC review / approval	March, 2002
- <u>Phase 3</u>	
- Licensee submits RISA	TBD



# Conclusion

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- **RISA is recommended in Reg. Guide 1.170**
- **Has been done before (e.g., initial submittal of System 80 Standard Plant FSAR)**
- **Good data base of operating experience exists**
- **Benefits in Safety and Efficiency**
- **CEOG plans to write a RISA guidance Topical Report**
  - **Submit to NRC for review in June of 2001**
  - **NRC completes review by March 2002**

