
**Public Meeting Regarding Option 3
Guidance on Risk-Informing
Regulations and Draft Plan for
Achieving Risk-Informed
Coherence in Reactor Safety Arena**

December 5, 2002

ATTACHMENT 3

Introduction

AGENDA

- ☐ 9:00 - 9:15 Introduction - NRC
- ☐ 9:15 - 10:45 Status of Risk-Informing 10 CFR Part 50 - NRC
- ☐ 10:45 - 11:00 Break
- ☐ 11:00 - 11:30 Overview of Draft Coherence Program - NRC
- ☐ 11:30 - 12:00 Discussion of Draft Coherence Program - all participants
- ☐ 12:00 - 1:00 Lunch
- ☐ 1:00 - 2:30 Discussion of Draft Coherence Program (cont.) - all participants
- ☐ 2:30 - 3:00 Conclusions and Next Steps - NRC

PURPOSE OF MEETING

- Discuss approach and plan
 - ▶ Risk-informing technical requirements of 10 CFR Part 50
 - ▶ Coherence Program Plan

- Solicit and gather information from stakeholders

***Risk-Informing Technical
Requirements of 10 CFR Part 50***

DISCUSSION QUESTIONS

(not limited to)

- Which regulations and technical requirements should be the next focus for Option 3 (i.e., after 10 CFR 50.46)?
 - ▶ GDC 17 (electric power supply)
 - ▶ Single failure criterion (beyond ECCS)
 - ▶ Others???
- Any benefit to risk-informing the special treatment requirements (beyond the scope aspect)?
 - ▶ Safety related requirements
 - ▶ QA, EQ, etc., requirements
- Other questions of interest?

STATUS OF TECHNICAL WORK

- Risk-informed 10 CFR 50.44 (Combustible Gas Control) in final rulemaking (completion in May 2003)
- Commission paper on 10 CFR 50.46 (SECY-02-0057)
- Technical reports on 50.46 to NRR (July 2002)
- Potential rulemaking effort on 50.46 initiated (GDC 35 working group)
- Continue feasibility work redefining large break LOCA
- Publish revision to framework (guidance document)
- Activities to determine which regulation to risk-inform

FRAMEWORK ⇨ GUIDANCE CRITERIA

- ❑ Finalize draft: guidance document
- ❑ Expand discussion (additional clarification)
 - ▶ Quantitative guidelines
 - ▶ Relationship of cornerstones and accident strategies to defense-in-depth
 - ▶ Defense-in-depth, uncertainties, safety-margins
 - ▶ Demonstrate relationship of surrogates to QHOs

ASSESSMENT FOR POTENTIAL RISK-INFORMED RULE MAKING

- Evaluate ROP findings
- Evaluate licensing actions
- Map regulations and technical requirements to cornerstones
- Evaluate special treatment requirements

EVALUATE ROP FINDINGS

Activity Examples:

- Frequent green findings associated with same regulation or technical requirement?
- Frequent green findings of similar concern (e.g., associated with same system), but different regulations?

EVALUATE LICENSING ACTIONS

Activity Examples:

- Nature of licensing requests?
 - ▶ Risk-informed?
 - ▶ Non-risk-informed?
- Licensing actions addressing same regulation or technical requirements?

MAP REGULATIONS AND TECHNICAL REQUIREMENTS TO CORNERSTONES

Activity Examples:

- For each reactor safety cornerstone, map regulations and technical requirements
 - ▶ Initiating events
 - ▶ Mitigating systems
 - ▶ Barrier integrity
 - ▶ Emergency preparedness
- Evaluation needs to consider not only concern directly addressed by regulation, but also influence of regulation on other cornerstones
 - ▶ Technical requirements can go beyond the regulation
- Is there a balance among the cornerstones by the regulations?
 - ▶ One cornerstone overly regulated?
 - ▶ One cornerstone under regulated?

EVALUATE SPECIAL TREATMENT REQUIREMENTS

Activity Examples:

- What requirements are causing SSCs to be safety-related?
- Are there any benefits to risk-informing the actual special treatment requirements, e.g., QA, EQ

APPENDIX A: QUANTITATIVE GUIDELINES

A.1 Introduction

Quantitative guidelines are developed in Chapter 3 of this report to assess the effectiveness of the regulation, and to ensure a reasonable balance among the strategies for defense-in-depth. The quantitative health objectives (QHOs) defined in the Safety Goals are used as the bases to measure the effectiveness of the regulations.

Unfortunately, the QHOs are difficult to apply in making risk-informed changes to the existing regulations. Therefore the following two numerical objectives were adopted in Regulatory Guide 1.174 as surrogates for the two QHOs:

- A core damage frequency (CDF) of $<10^{-4}$ per year as a surrogate for the latent cancer QHO
- A large early release frequency (LERF) of $<10^{-5}$ per year as a surrogate for the early fatality QHO.

The objective of this appendix is to demonstrate how the above two numerical objectives were derived from the QHOs.

A.2 Quantitative Health Objectives

The following are definitions of the QHOs taken directly from the Safety Goal Policy Statement:

"The risk to an average individual¹ in

¹The Safety Goal Policy further states that the average individual in the vicinity of the plant is defined as the average individual biologically (in terms of age and other risk factors) and who resides within a mile from the plant site boundary. This means the dose conversion factors (DCFs) that translate exposure to dose (and hence risk) are for an average adult person (i.e., infant DCFs, etc. are not evaluated). In addition the

the vicinity of a nuclear power plant of prompt fatalities² that might result from reactor accidents should not exceed one-tenth of one percent (0.1%) of the sum of prompt fatality risks resulting from other accident to which members of the U.S. population are generally exposed."

"The risk to the population in the area of nuclear power plant of cancer fatalities³

average individual risk is found by accumulating the estimated individual risks and dividing by the number of individuals residing in the vicinity of the plant. (The statement also states that if there are no individuals residing within a mile of the plant boundary, an individual should, for evaluation purposes, be assumed to reside 1 mile from the site boundary).

²An accident that results in the release of a large quantity of radionuclides to the environment can result in acute doses to specific organs (e.g., red blood marrow, lungs, lower large intestine, etc.) in individuals in the vicinity of the plant. These acute doses can result in prompt (or early) health effects, fatalities and injuries. Doses that accumulate during the first week after the accidental release are usually considered when calculating these early health effects. The possible pathways for acute doses are: inhalation, cloudshine, groundshine, resuspension inhalation, and skin deposition. Cloudshine and inhalation are calculated for the time the individual is exposed to the cloud. Groundshine and resuspension inhalation doses for early exposure are usually limited to one week after the release. The doses accumulated during this early phase can be significantly influenced by emergency countermeasures such as evacuation and sheltering of the affected population. Early fatality is generally calculated using a 2-parameter hazard function. A organ dose threshold is incorporated into the hazard function such that below the threshold the hazard is zero. (For example, the default value of the threshold for acute dose to red marrow is 150 rem in (Ref. A.1)). An early fatality is defined as one that results in death within 1 year of exposure.

³Lifetime 50-year committed doses can result in latent cancer fatalities. These doses occur during the early exposure phase (within one week of the release) from the early pathways, i.e. cloudshine, groundshine, inhalation, and resuspension inhalation, and the long-term phase from the long-term pathways that include groundshine, resuspension inhalation, and ingestion (from contaminated food and water). Just as early exposure can be limited by protective actions such as evacuation during the early phase, chronic exposure during the long-term phase can also be limited by actions such as population relocation, interdiction of contaminated land for habitation if it cannot be decontaminated in a cost-effective manner (within a 30-year period), food and crop disposal, and interdiction of farmland. A piecewise linear dose-response model is generally used to estimate cancer fatalities. A dose and dose rate reduction factor is used at low dose rates (<0.1 Gy per hour) and for low doses (<0.2 Gy) to estimate cancer fatalities based on the recommendations of the International Commission on Radiation Protection in their ICRP 60 report. Up to 20 organs are included for estimation of latent cancers (e.g., lungs, red bone marrow,

that might result from nuclear power plant operation should not exceed one-tenth of one percent (0.1%) of the sum of cancer fatality risks resulting from all other causes."

These QHOs have been translated into two numerical objectives, as follows:

- The individual risk of a prompt fatality from all "other accidents to which members of the U.S. population are generally exposed," such as fatal automobile accident, etc., is about 5×10^{-4} per year. One-tenth of one percent of this figure implies that the individual risk of prompt fatality from a reactor accident should be less than 5×10^{-7} per reactor year (ry). The "vicinity" of a nuclear power plant is understood to be a distance extending to 1 mile from the plant site boundary. The individual risk (IER) is determined by dividing the number of prompt or early fatalities (societal risk) to 1 mile due to all accidents, weighted by the frequency of each accident, by the total population to 1 mile and summing over all accidents.

For example:

The conditional probability of an individual becoming a prompt (or early) fatality (CPEF) for an accident sequence "n" can be expressed by the following:

$$CPEF_n = \frac{EF_n}{TP(1)} \quad \text{Equation 1}$$

Where: EF_n = number of early fatalities within 1 mile conditional on the occurrence of accident sequence "n"

$TP(1)$ = total population to 1 mile

small intestine, lower large intestine, stomach, bladder wall, thyroid, bone surface, breast, gonads, etc.)

It follows that the individual early risk (IER) is the sum of the CPEF (weighted by the frequency/ry) for all accidents (N) that result in a large early release of sufficient magnitude to cause early fatalities:

$$IER = \sum_1^N (CPEF_n \cdot LERF_n) \quad \text{Equation 2}$$

Where: $LERF_n$ = frequency/ry of a large early release capable of causing early fatalities for accident sequence "n"

- "The sum of cancer fatality risks resulting from all other causes" is taken to be the cancer fatality rate in the U.S. which is about 1 in 500 or 2×10^{-3} per year. One-tenth of one percent of this implies that the risk of cancer to the population in the area near a nuclear power plant due to its operation should be limited to 2×10^{-6} /ry. The "area" is understood to be an annulus of 10-mile radius from the plant site boundary. The cancer risk is also determined on the basis of an individual, i.e., by evaluating the number of latent cancers (societal risk) due to all accidents to a distance of 10 miles from the plant site boundary, weighted by the frequency of the accident, dividing the total population to 10 miles, and summing over all accidents. For example:

The conditional probability of an individual becoming a latent, cancer, fatality (CPLF) for an accident sequence "m" can be expressed in a similar manner to that shown above:

$$CPLF_m = \frac{LF_m}{TP(10)} \quad \text{Equation 3}$$

Where: LF_m = number of latent, cancer, fatalities within 10 miles conditional on the occurrence of accident

TP(10) = total population to 10 miles
 sequence "m"

It follows that the individual latent risk (ILR) is the sum of the CPLF (weighted by the frequency/ry) for all accidents (M) that result in a release of sufficient magnitude to cause latent cancer fatalities:

Equation 4

$$ILR = \sum_1^M (CPLF_m * LRF_m)$$

Where: LRF_m = frequency/ry of a large release capable of causing latent cancer fatalities for accident sequence "m"

conditions necessary for a large release, CLLRP_x = 1.0. Therefore LRF_x = CDF_x and equation 4 becomes:

$$ILR_x = CPLF_x * CDF_x \quad \text{Equation 6}$$

CPLF values were reported for a range of NPPs in the supporting documentation for NUREG-1150 (Ref. A.2). For the purposes of this example the Surry (Ref. A.3) results will be utilized. The largest CPLF (within 10 miles) for internal initiators is reported in Table 4.3-1 of reference Z to be 4*10⁻³. This CPLF value corresponds to a large opening in containment and a very large release. It is therefore consistent with the worst case assumptions for accident scenario "x". Using this value of CPLF and assuming a CDF goal of 10⁻⁴ per year an estimate of the individual latent risk can be made using equation 6:

$$ILR_x = (4 * 10^{-3}) * (10^{-4}) = 4 * 10^{-7} \text{ per year}$$

A.3 Surrogate for Latent Fatality QHO

Even at a densely populated U.S. site, if a plant's score damage frequency is 10⁻⁴ per year or less, the latent cancer fatality QHO is generally met with no credit taken for containment. This can be demonstrated numerically by assuming that one accident sequence "x" dominates the latent cancer fatality risk and the LRF, which is defined as:

The ILR corresponding to a CDF = 10⁻⁴ per year is less than the latent cancer QHO of 2*10⁻⁶ per year by a factor of five. Therefore using a CDF goal of 10⁻⁴ per year will ensure that the latent cancer QHO is generally met with reasonable margin.

$$LRF_x = CDF_x * CLLRP_x \quad \text{Equation 5}$$

Where: CDF_x = core damage frequency for accident sequence "x"

CLLRP_x = conditional large late release probability for accident sequence "x"

Assuming a worst case scenario:

- an open containment
- an unscrubbed release, and
- a large opening in containment.

Given an open containment and all of the

A.4 Surrogate for Early Fatality QHO

The early fatality QHO is more restrictive than the latent cancer QHO. If a plant's large early release frequency (LERF) is 10⁻⁵ per year or less, the early fatality QHO is generally met. This can again be demonstrate numerically by assuming that one accident sequence "y" dominates the early fatality risk and the LERF, which is defined as:

$$LERF_y = CDF_y * CLERP_y \quad \text{Equation 7}$$

Where: CDF_y = core damage frequency

CLERP_y = conditional large early release probability for accident sequence "y" for accident sequence "y"

Again assuming a worst case scenario:

- an open containment which occurs early in the accident sequence
- an unscrubbed release that also occurs early before effective evacuation of the surrounding population, and
- a large opening in containment.

Given an open containment and all of the conditions necessary for a large early release, CLERP_y = 1.0. Therefore LERF_y = CDF_y and equation 2 becomes:

$$IER_y = CPEF_y * CDF_y \quad \text{Equation 8}$$

CPEF values were again taken from the Surry (Ref. Z) results. The largest CPEF (within 1 mile) for internal initiators is reported in Table 4.3-1 of reference Z to be $3 \cdot 10^{-2}$. This conditional risk value corresponds to a large opening in containment and a very large release that is assumed to occur early before effective evacuation of the surrounding population. It is therefore consistent with the worst case assumptions for accident scenario "y". Using this value of CPEF and assuming a LERF goal of 10^{-5} per year an estimate of the individual early risk can be made using equation 8:

$$IER_y = (3 \cdot 10^{-2}) * (10^{-5}) = 3 \cdot 10^{-7}/\text{year}$$

The IER corresponding to a LERF = 10^{-5} per year is less than the early fatality QHO of $5 \cdot 10^{-7}$ per year by a factor of about two. Using a LERF goal of 10^{-5} per year will generally ensure that the early fatality QHO is met.

Therefore a LERF of 10^{-5} /year is an acceptable surrogate for the QHOs. The quantitative guidelines developed for each strategy of the framework is derived from a LERF of 10^{-5} per year, which is discussed in detail in Chapter 3.

A.5 References

- A.1 A discussion of the dose conversion factor databases embedded in MACCS and their use for various types and purposes of calculations performed in the code is contained in the MACCS2 code manual [Chanin and Young, "Code Manual for MACCS2: User's Guide, NUREG/CR-6613, Vol. 1: SAND97-0594, Sandia National Laboratories, May 1998.]
- A.2 USNRC, "Severe Accident Risks: An Assessment for Five U.S. Nuclear Power Plants," NUREG-1150, December 1990.
- A.3 USNRC, "Evaluation of Severe Accident Risks: Surry, Unit 1," NUREG/CR-4551, Vol. 3, October 1990.



On the Use of RI Option 3 Framework

John Gaertner

Technical Lead – Risk Technology

EPRI Nuclear



Introduction

- A Framework with decision criteria is desirable to establish risk-informed technical requirements
- As much coherence as *practical* is desirable for decisions on existing plants, new LWRs, new non-LWRs. *But,...*
a single Framework is probably not possible.
- The RI Option 3 Framework requires revisiting, if it is the starting point for a coherent Framework

Outcomes of Effective Option 3 Framework

- Consistent application of evaluation criteria
- Timely identification and evaluation of candidate regulations which can be changed safely
- Cost-effective regulatory change based on best estimate risk assessment
- Use of risk management and performance monitoring for efficiency and effectiveness

Option 3 Framework Features which Limit Effectiveness

- Partitioning CDF and LERF criteria
- Arbitrary quantitative criteria for defense-in-depth
- Focus on absolute vs relative risk
- No criteria for additions which reduce risk
- Criteria for considering uncertainty
- Complexity of any evaluation using the Framework

50144 + 651489
if bundled

Too complex

Features of Option 3 which Enhance Coherence and Effectiveness

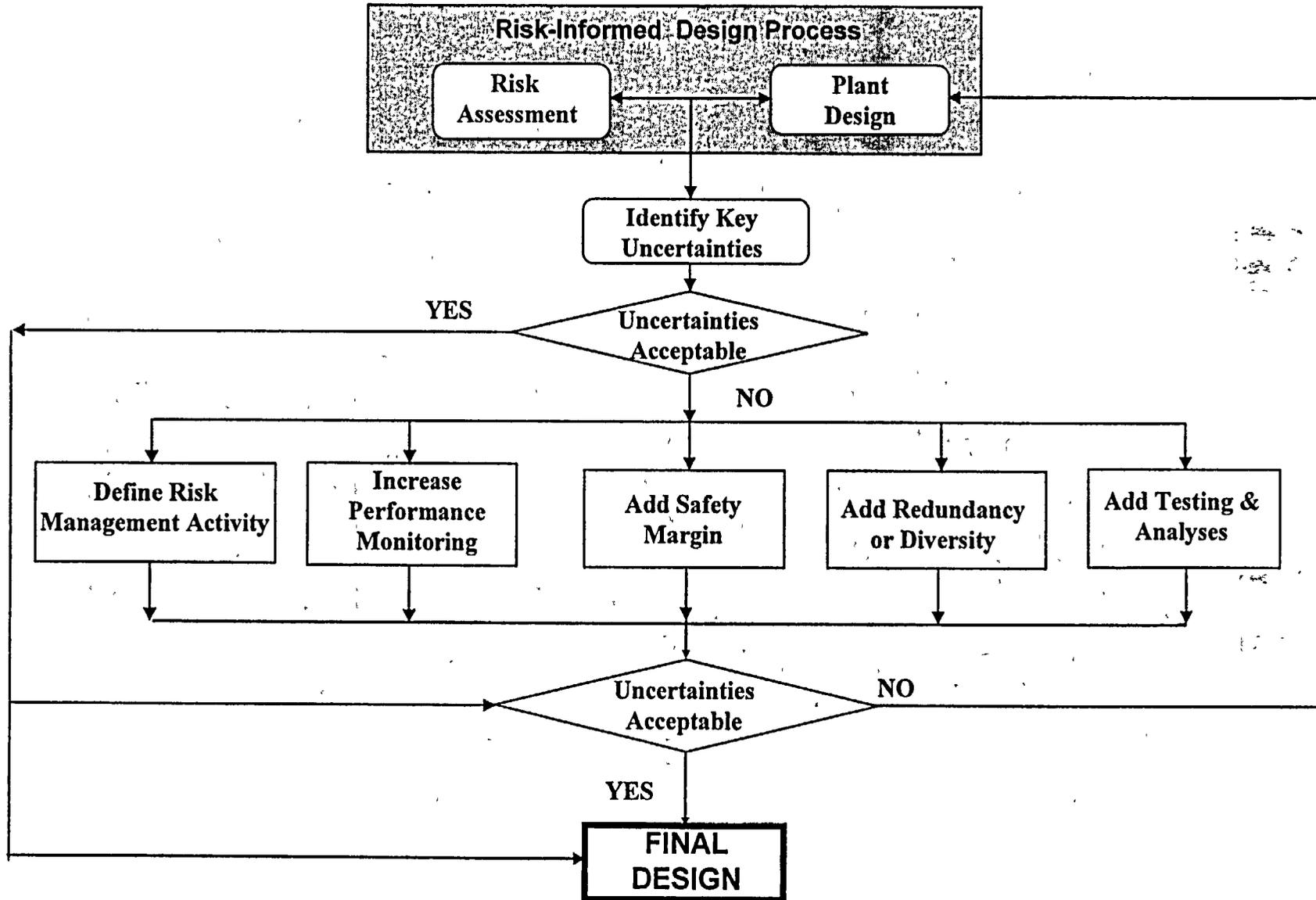
- Risk-informed, defense-in-depth approach
- Consistency with Cornerstones of the ROP
- Consideration of industry-wide impacts of proposed change
- Structured consideration of uncertainties and completeness issues
- Consistency with Regulatory Guide 1.174

Suggestions for Coherent Frameworks

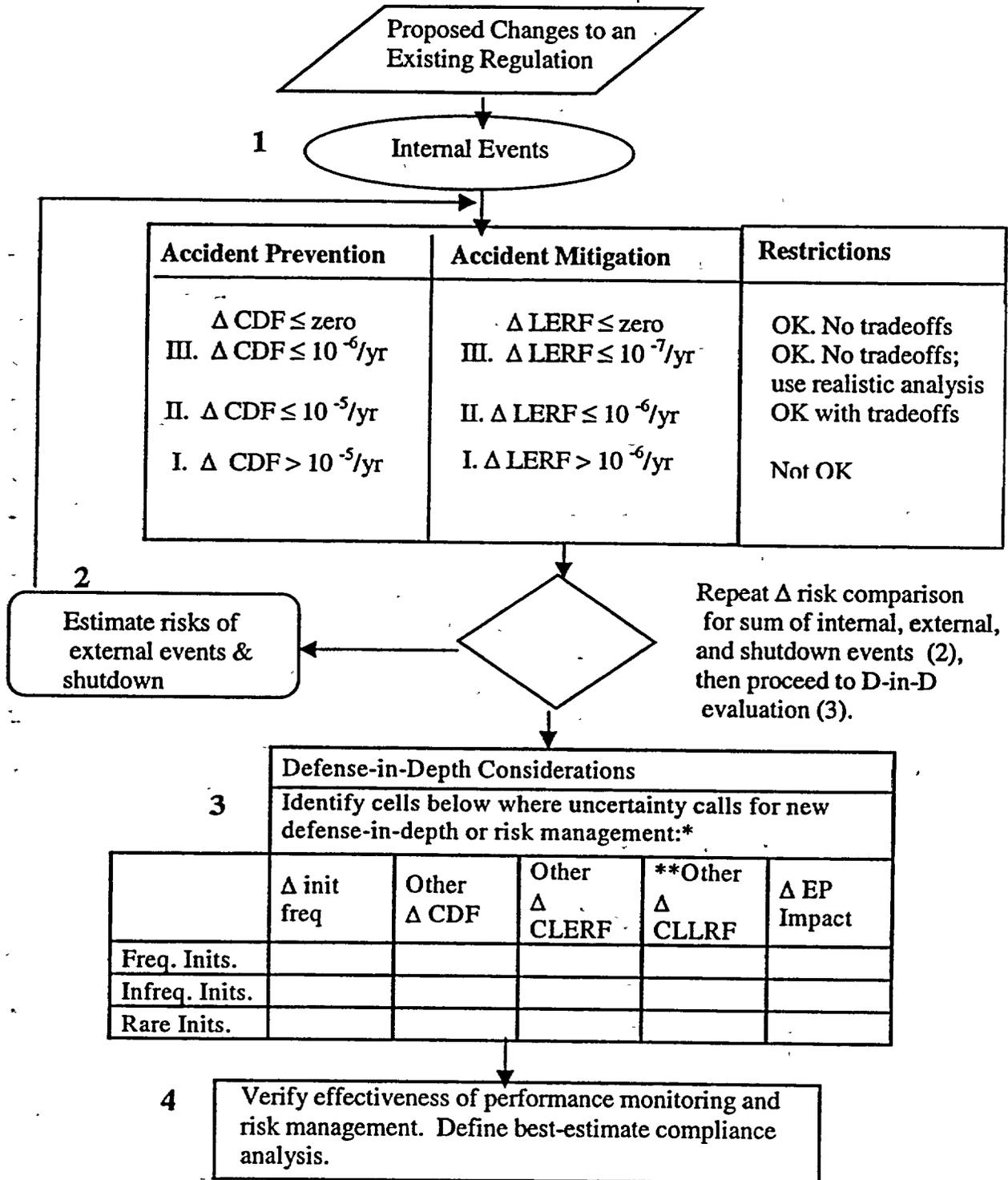
- Consider EPRI Alternative Framework Process for Option 3 which minimizes problems experienced to date
 - Based on delta risk
 - Less quantification of defense-in-depth
- Consider New Plant Framework in NEI 02-02 which has much coherency and effective features of EPRI Option 3 Alternative
 - Based on absolute risk
 - Applies to all reactor types
- Success demands reliance on monitoring and risk management in lieu of perfect pre-operational analysis
- Need for a practical and comprehensive strategy for defense-in-depth.

NEI 02-02

Defense-in-Depth Process



Alternative Framework Process



* For all cells above consider effects on common cause failures, human response, functional redundancy/diversity, GDC criteria, and safety margin. Is there high confidence that risk increase is known and acceptable, and that degradation of defense-in-depth is not significant?
 **NRC objective is avoiding prompt fatalities within 24 hours of core damage.

Framework for Risk-Informed Changes to the Technical Requirements of 10CFR50

1. Introduction

This alternative framework for risk-informing NRC technical requirements builds on the draft NRC framework document, *Framework for Risk-Informed Changes to the Technical Requirements of 10CFR50 (Draft, Rev 2, August 200)*, that was an attachment to NRC SECY 00-198, *Status Report on Study of Risk-Informed Changes to the Technical Requirements of 10 CFR Part 50 (Option 3) and Recommendations on Risk-Informed Changes to 10 CFR 50.44 (Combustible Gas Control)*.

2. Need for a Framework for Risk-Informed Changes to Technical Requirements

The industry recognizes the need for a framework for evaluating the potential impact of risk-informed changes to the technical requirements of 10 CFR Part 50. This framework will have value if it achieves the following outcomes:

1. Consistent application of evaluation criteria,
2. Timely identification and evaluation of candidate regulations which can be changed safely,
3. Cost-effective regulatory change based on best estimate risk assessment, and
4. Use of risk management and performance monitoring for efficiency and effectiveness.

This alternative framework specifically addresses the following features of the NRC draft framework which limit its effectiveness: 1) partitioning the CDF and LERF criteria, 2) arbitrarily quantifying defense-in-depth, 3) focusing solely on absolute risk, and 4) having no criteria for additions which reduce risk.

The alternative framework applies to existing plants. It is a risk-informed, performance-based approach. It incorporates the following concepts contained in the NRC framework:

- A risk-informed, defense-in-depth approach
- Consistency with Cornerstones of the Reactor Oversight Program
- Consideration of industry-wide impacts of proposed changes
- Structured consideration of uncertainties and completeness issues
- Consistency with Regulatory Guide 1.174

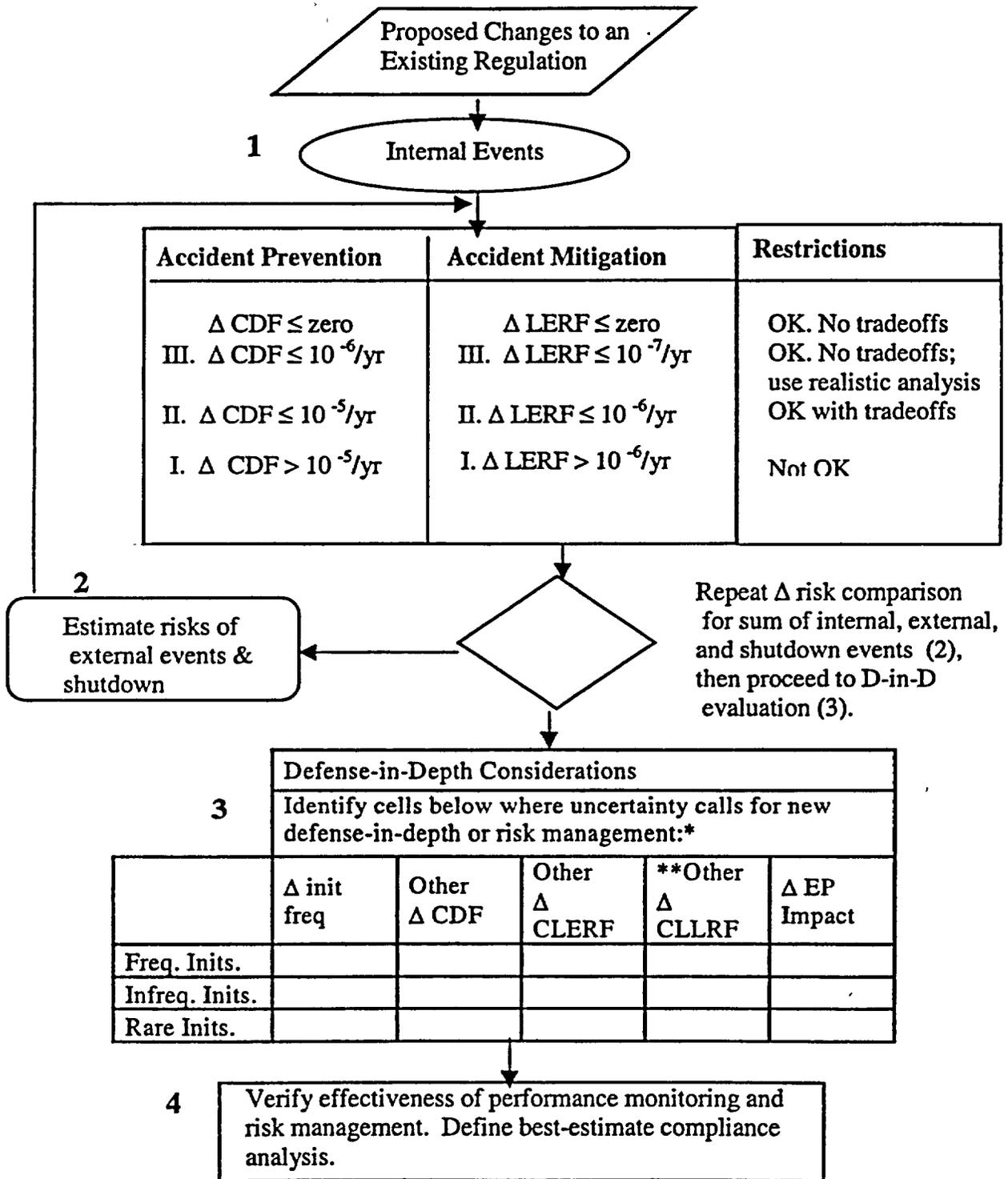
3. Alternative Framework

1. Changes in CDF and in LERF are the primary quantitative risk criteria. The changes are representative average values for the affected fleet of plants.

2. Proposed changes that reduce requirements and result in a minimal increase in risk less than 10^{-6} /yr for CDF or 10^{-7} /yr for LERF would be implemented (Region III)¹. The change would also be implemented if the change only affects a rare initiator with a frequency below 10^{-6} /yr.
3. Average baseline risk (i.e.; CDF and LERF) is also considered whenever the changes under consideration increase average risk values for the affected plants by more than 10^{-6} /yr for CDF or 10^{-7} /yr for LERF but less than 10^{-5} /yr for CDF or 10^{-6} /yr for LERF (Region II)¹. The change is allowed if average baseline risk is less than 10^{-4} /yr CDF and 10^{-5} /yr LERF. However, NRC can propose tradeoffs which preserve the original benefit of the reduced requirements but which reduce the risk increase to below 10^{-6} /yr for CDF or 10^{-7} /yr for LERF. Because the change is optional, industry stakeholder buy-in would be essential before the regulatory change is proposed.
4. Proposed changes that result in a risk increase of greater than 10^{-5} /yr for CDF or 10^{-6} /yr for LERF would not be implemented (Region I)¹.
5. Proposed changes that increase or add requirements and that result in a reduction of risk should stand on their own merits, and not be tradeoffs with requested cost-beneficial changes except as described above. Of course, the standard §50.109 cost-benefit backfit test is still available for mandatory changes.
6. External events and shutdown modes are formally considered in the framework. Their contributions to risk are kept separate, however, to account for use of qualitative or less rigorous methods and greater uncertainty.
7. Defense-in-depth is evaluated objectively but qualitatively after the risk criteria are fully evaluated. Additional defense-in-depth is specified only to account for uncertainty in risk or degradations of defense-in-depth introduced by the changes.
8. In lieu of defense-in-depth to account for risk uncertainty, performance monitoring or risk management activities can be specified. Preference should be given to such activities already in place at plants.
9. Ongoing performance monitoring and risk monitoring activities should be shown to adequately provide assurance that the anticipated risk levels of the regulatory change are achieved. Effectiveness of these activities should also be regularly assessed.
10. Compliance with new risk-informed regulations, as a practical matter, must still use deterministic analysis. Best-estimate assumptions should be used for such analysis if the absolute risk contribution is less than 10^{-5} /yr for CDF or 10^{-6} /yr for LERF. For absolute contribution less than the criteria above, there is no need for the requirement and no need for a deterministic analysis.

¹ The Regions correspond to the regions defined in RG 1.174.

Alternative Framework Process



* For all cells above consider effects on common cause failures, human response, functional redundancy/diversity, GDC criteria, and safety margin. Is there high confidence that risk increase is known and acceptable, and that degradation of defense-in-depth is not significant?

**NRC objective is avoiding prompt fatalities within 24 hours of core damage.

INSPECTION FINDINGS SUMMARY

PLANT	REGION	DATE	REPORT#	LEVEL	CNRSTN	REG
Browns Ferry 2	2	3/22/2002	2001005	G NCV	IE	MSLB
Browns Ferry 2	2	3/22/2002	2001005	G NCV	MS	steam line break
		9/23/2000	200004	G NCV	IE	RPS
		9/23/2000	200004	G NCV	IE	rx level
		9/22/2001	2001003	SL4 NCV	MS	asme code boundary leakage
		9/22/2001	2001003	G NCV	MS	App R Crit. II.L.2.b. alternate shutdown
		9/22/2001	2001003	G NCV	MS	fire dampers
		3/24/2001	2000006	G NCV	MS	ECCS
		12/22/2001	2001004	G NCV	B	CR ventilation

SYSTEM	DESCRIPTION
MS	pressure transmitter root valve throttled nearly shut
RCIC	steam line space temp. sensors improperly replaced
NI	failure to conduct surveillance of IR and PR instrument channel checks
RPS	Improperly returned Rx level instr to service causing scram
Core Spray	isolatable leak on vent line from core spray isolation valve; inadequate 50.59 for change allowing 48hr LCO
RHR	control cables not adequately protected as required by App R
EDG	inadequate fire damper maint. Results in inop EDG
RHR	inadequate eval of RHR flow test results; App B crit XI
CR Emerg Vent	door blocked open 3 hrs for painting resulted in CR Emerg Vent OOS

GDC	Initiating Events	Mitigation	Barriers	EP	Public Rad. Safety	Occupational Safety	Safeguards	Administration	Financial	Operational
1		x	x					x		x
2		x								
3	x	x								
4		x								
5		x								
10			x							
11	x									
12	x									
13	x		x							
14*	x	x	x							
15*	x									
16			x							x
17		x								
18		x								x
19		x								x
20	x	x								
21		x								x
22		x								
23		x								
24		x								
25		x								
26		x								
27		x								
28	x									
29	x	x								
30	x		x					x		
31			x							
32			x							
33		x								
34		x								
35		x								
36		x								
37		x								
38		x	x							
39		x								
40		x								
41		x	x							
42		x								

1	A	B	C	D	E	F	G	H	I	J	K	L
	GDC/Reg/App.	Initiating Events	Mitigation	Barriers	EP	Public Rad. Safety	Occupational Safety	Safeguards	Administraton	Financial	Operational	
86												
87	§50.20								x			
88	§50.21								x			
89	§50.23								x			
90												
91												
92												
93												
94												
95	§50.30								x			
96	§50.31								x			
97	§50.32								x			
98	§50.33								x			
99	§50.33a								x			
100	§50.34	x	x	x					x	x		
101	§50.34a					x	x					
102	§50.35								x			
103	§50.36	x	x	x					x		x	
104	§50.36a					x						
105	§50.36b											
106	§50.37							x	x			
107	§50.38								x			
108	§50.39								x			
109	§50.40								x			
110	§50.41								x			
111	§50.42								x			
112	§50.43								x			
113	§50.44		x									
114	§50.45								x			
115	§50.46		x									
116	§50.47				x							
117	§50.48	x	x									
118	§50.49		x									
119	§50.50								x			
120	§50.51								x			
121	§50.52								x			
122	§50.53								x			
123	§50.54					x		x	x			
124	§50.55								x			
125	§50.55a		x	x					x		x	
126	§50.56								x			
127	§50.57								x			

NRC Coherence Program for Reactor Safety Arena

**Public Meeting
December 5, 2002**

ATTACHMENT 9

Discussion Questions

- Comments on clarity, direction, and completeness of plan?
- What does “unified safety concept” mean to you?
- Ideas for regulatory activities to include in scope?
- How do new reactors fit in plan?

Need For Change

- Stakeholders believe we are inconsistent
- NRC staff is often frustrated
- ROP findings

Commission Direction

- SRM dated February 8, 2002
 - “in the next version of the RIRIP, the staff should provide its plan for moving forward with risk-informed regulation to address regulatory structure convergence with our risk-informed processes”

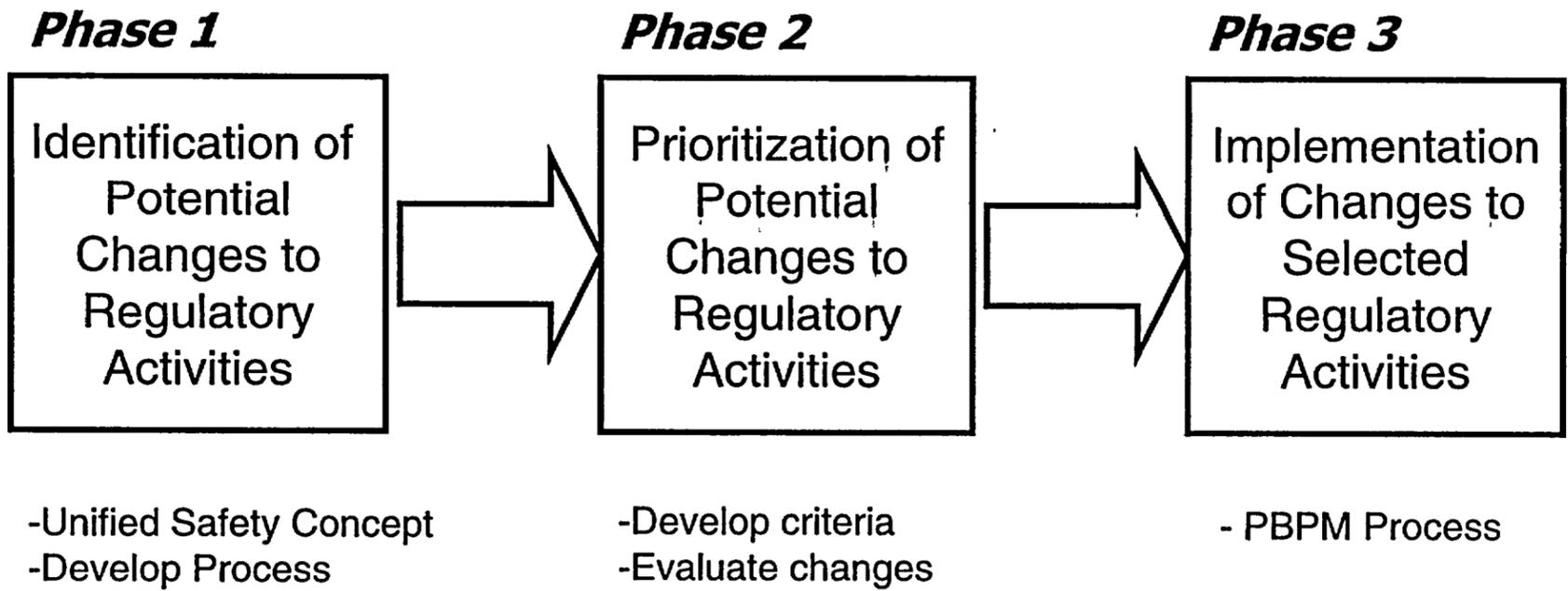
Coherence Program Objective

- Develop an approach in which the reactor regulations, staff programs, and processes are:
 - built on a unified safety concept
 - properly integrated so that they complement one another

Scope & Limitations

- Assess current activities
- Focus on regulatory structure
- New activities will be coherent
- Lead activities remain in each respective organization
- Current efforts continue unimpeded
 - may be re-evaluated and adjusted

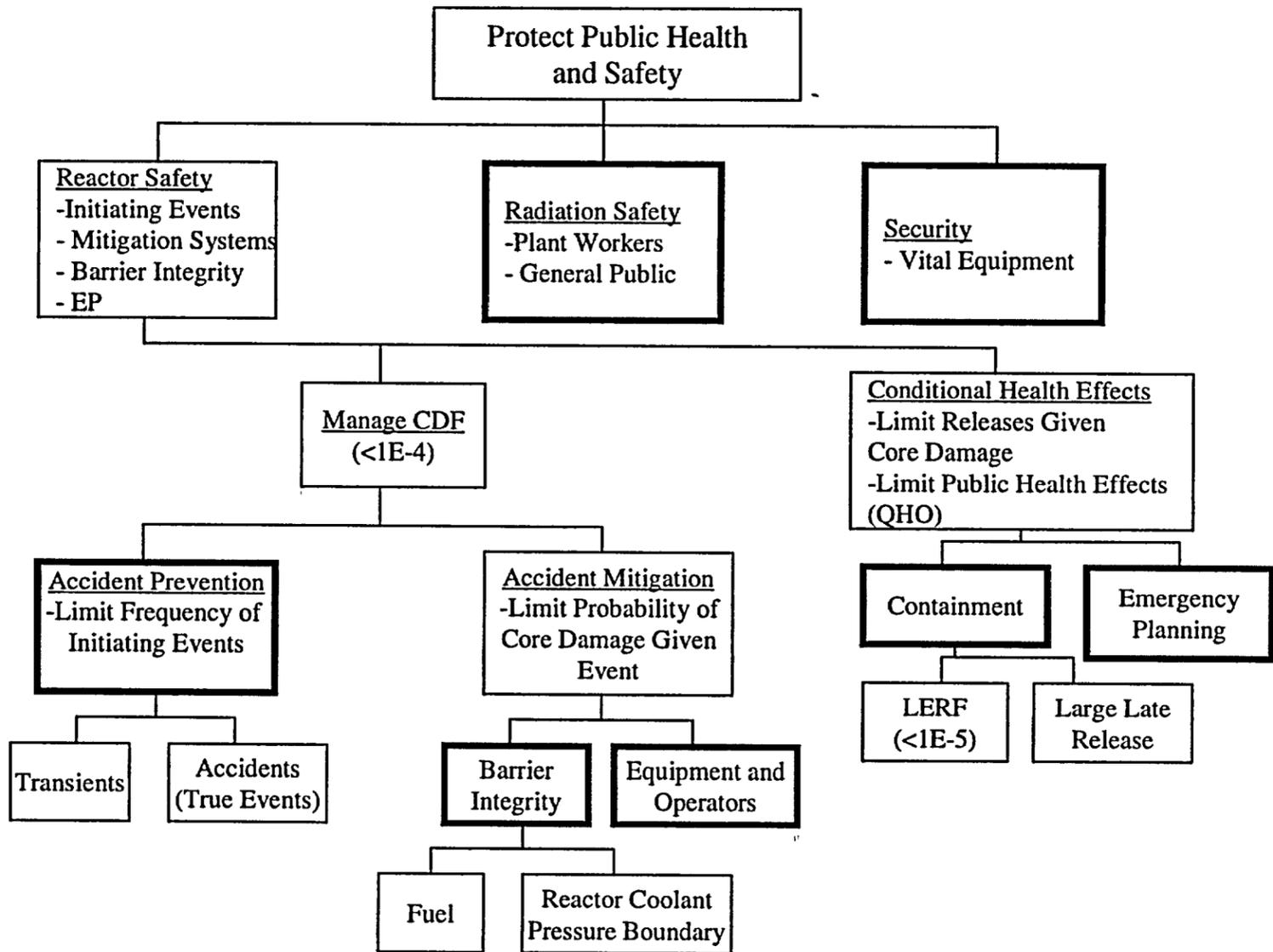
Approach



Phase 1: Identification of Potential Changes to Regulatory Activities

- Effort is performed in an iterative manner
- Three major tasks:
 - Development of Process for a Risk-Informed Coherence Effort (PRICE)
 - Identification of Regulatory Activities
 - Evaluation and Selection of Regulatory Activities

Preliminary Ideas - Unified Safety Concept



Phase 2: Prioritization of Potential Changes to Regulatory Activities

- Two Major Tasks:
 - Develop prioritization criteria
 - Evaluate activities against criteria
- Prioritization Criteria
 - Address the four performance goals
 - Consider resources, time and feasibility

Phase 3: Implementation of Changes to Selected Regulatory Activities

- PBPM process
- Make appropriate modifications to regulatory activities
- Coherence working group assists responsible organizations
- Details of this phase of the plan to be developed later

Communication

- Identify who the stakeholders are (internal and external)
- Identify the messages
- Provide the structure for communicating the messages

Proposed Schedule

Milestone	Date
Brief ACRS Subcommittee	January 2003
Preliminary Draft of: -PRICE -Terminology Glossary	February 2003
Public Meeting	February 2003
Preliminary assessment/evaluation of regulatory activities	April 2003
Public Meeting	May 2003
Status report to Commission	June 2003
Initial prioritization	September 2003
Public Meeting	October 2003
Status report to Commission	December 2003

Regulatory Coherence in the Strategic Area of Radiation Safety

General

- Regulations for public radiation safety (primarily 10 CFR 50 Part 50.36a and Appendix I) are based on concepts and methodology that are no longer considered scientifically valid and are inconsistent with other dose-related criteria applicable to licensing and operating nuclear power plants. In addition, the regulations have not been substantially updated since their inception and do not reflect operational experience gained.
- Regulations for occupational radiation safety (10 CFR Parts 19 and 20) apply to the full range of NRC materials, fuel cycle, and reactor licensees and ~~are~~ contain prescriptive details necessary to assure adequate protection to a diverse set of licensee situations. In addition, the regulations are based on scientific concepts that are somewhat out of date, but are nevertheless consistent with other dose-related criteria applicable to nuclear power plants (with the exception noted above for public radiation safety).
- The underlying scientific and conceptual basis for radiation safety is currently undergoing revision (i.e., by the IAEA, ICRP, NCRP, UNSCEAR, and NAS), which is expected to lead to the issuance of new criteria and methods in several years. Much can be done to restructure the current regulations to better position the agency to respond efficiently to those changes, consistent with Commission direction (SECY-01-0148).

Public Radiation Safety Cornerstone

- Update the concepts and methods to be consistent with other dose-related criteria applicable to nuclear power plants.
- Remove unnecessary operational constraints to reflect operational experience gained.
- Reduce unnecessary implementation burden by simplifying the numerous dose guidelines and criteria to a single "total effective dose equivalent" value.

Occupational Radiation Safety

- Improve flexibility in application and ease of future updating by creating a rule (e.g., a provision in Part 50) that is specifically applicable to nuclear power plants.
- Reduce unnecessary burden by improving the performance-base of the regulation and removing prescriptive details.
- Better align the regulation with the regulatory oversight process by focusing on performance, rather than compliance.