



UNITED STATES  
NUCLEAR REGULATORY COMMISSION  
WASHINGTON, D.C. 20555-0001

January 10, 1997

MEMORANDUM TO: Hugh L. Thompson, Jr.  
Acting Executive Director for Operations

FROM: Denwood F. Ross, Jr., Acting Chairman  
Committee to Review Generic Requirements *DFR*

SUBJECT: MINUTES OF CRGR MEETING NUMBER 295 - PART I

The Committee to Review Generic Requirements (CRGR) met on Tuesday, November 12, 1996, from 9:00 a.m. to 5:00 p.m. A list of attendees is provided in Attachment 1.

At this CRGR meeting, the Committee was briefed by the staff on the status and schedule of the ongoing rulemaking on Shutdown Operation and Operations Involving Fuel Storage Pools at Nuclear power Plants (10 CFR 50.67). Part I of the minutes of the CRGR Meeting No. 295 covers only the Committee's review of this rulemaking (Attachment 2). The Committee made several comments on the scope of this rulemaking and identified several significant technical and policy issues which need better consideration (e.g., need for critical peer review of PRA and PRA results; need for backfit analysis; use of objective, measurable or calculable, and enforceable performance criteria; and appropriate configuration control considerations). A memorandum, dated November 27, 1996, from Chairman, CRGR to Director, DSSA/NRR consolidated the Committee's recommendations.

Additionally, during CRGR Meeting No. 295, the Committee reviewed the general Regulatory Guide on proposed PRA applications (DG-1061), and the Standard Review Plan (SRP) associated with the general Regulatory Guide. Previously, at the CRGR Meeting No. 294, the staff had briefed the Committee on these documents and the five proposed PRA Application Regulatory Guides and their related SRPs, and also discussed the proposed schedule for submittal of the documents for CRGR review and publication for comment. Subsequently, the Committee reviewed some of the other PRA applications regulatory guides and the accompanying SRPs at CRGR Meeting No. 297, held on November 26, 1997. The CRGR staff, with the approval of the Acting Chairman, CRGR, plans to issue combined minutes for CRGR Meeting No. 294, No. 295 (Part II) and 297 (held on October 26, November 12, and November 26, 1996, respectively). The combined minutes will only discuss the Committee's review of the PRA applications regulatory guides and the associated SRPs.

In accordance with the EDO's July 18, 1983 directive concerning "Feedback and Closure of CRGR Review," a written response is required from the cognizant office to report agreement or disagreement with the CRGR recommendations in these minutes. The response is to be forwarded to the CRGR Chairman and if there is disagreement with the CRGR recommendations, to the EDO for decision making.

*R002*

Hugh L. Thompson

- 2 -

Questions concerning these meeting minutes should be referred to Raji Tripathi (415-7584).

Attachments: As stated

cc: Commission (5)  
SECY  
J. Lieberman, OE  
E. Halman, ADM  
H. Bell, OIG  
K. Cyr, OGC  
J. Larkins, ACRS  
Office Directors  
Regional Administrators, RI/RII/RIII/RIV  
CRGR Members  
G. Holahan, NRR  
W. Hodges, RES

Attachment 1 to the Part I of the Minutes of CRGR Meeting No. 295

Attendance List

November 12, 1996

CRGR Members

D. Ross (for E. Jordan)  
B. Sheron (for F. Miraglia)  
M. Knapp  
J. Murphy  
D. Dambly  
C. W. Hehl

CRGR Staff

R. Tripathi  
J. Conran

NRC Staff

G. Holahan  
W. Hodges  
R. Jones  
M. Cunningham  
A. El-Bassioni  
J. Shapaker  
J. Johnson, OCM/CM  
M. Virgilio  
K. Desai  
G. Mizuno  
S. Jones  
W. Lyons  
M. Cheok  
G. Parry  
M. Rubin  
T. Hsia, OCM/ND  
M. Fleishman, OCM/KR  
J. Beall, OCM/EM  
B. Holian, OCM/CM  
J. Sorensen, OCM/KR  
J. Flack  
M. Pohida  
T. Tjader  
B. McCabe  
E. Weiss  
C. Berlinger  
G. Hubbard  
J. Monninger

Attachment 2 to Part I of the Minutes of CRGR Meeting No. 295

Proposed Rulemaking on  
Shutdown Operation and Operations Involving Fuel Storage Pools

November 12, 1996

**TOPIC**

R. Jones (NRR) briefed the CRGR on the status and schedule of the ongoing rulemaking on Shutdown Operation and Operations Involving Fuel Storage Pools at Nuclear power Plants (10 CFR 50.67).

**BACKGROUND**

No formal review material was received from the staff. The briefing material distributed at the meeting is included as Attachment 2-A.

**RECOMMENDATIONS/CONCLUSIONS**

The CRGR offered several comments for the staff to consider during development of this rule. The Committee recommends that the following general areas related to this rulemaking effort be given better consideration:

- **Backfit Analysis:** Spent fuel pool operations part of the proposed rule imposes a new requirement. Therefore, a backfit analysis, in accordance with 10 CFR 50.109, is required; however, no backfit analysis appears to have been done.
- **Peer review:** In the Regulatory Analysis, PRA - approach, assumptions and results - need peer review. The numbers seem to be incredibly high.
- **Safety Goals:** Are Safety Goals applicable?
- **Terminology used:** "safety requirements" should be called "performance criteria." Furthermore, performance criteria, in general, must be either measurable or calculable. It is unclear how the proposed performance criteria would meet this test. The Committee recommends that these subjective criteria need to be replaced by performance criteria that are measurable and enforceable (via audit and inspection). Also, appropriate inspection procedures need to be developed.
- **Ultimate Heat Sink:** The Regulatory Analysis supposedly addresses measures to transfer heat to the ultimate heat sink, but this crucial consideration is not explicitly addressed in the rule.
- **Backup capability** - It is not clear if this proposed requirement is pushing the design toward three- or four-train systems. Additionally, no consideration seems to be given to the support systems.

- **Criticality:** Are spent fuel pool criticality aspects considered? For example, is safety-grade instrumentation intended for criticality monitoring?
- **Configuration control:** The proposed rule does not explicitly address configuration control; specifically, the concerns related to the Vogtle, Diablo Canyon and Palo Verde events.
- **Initiating events/Accident scenarios:** The staff indicated at the briefing that the licensees don't have to postulate initiating events during shutdown, and to demonstrate ability to cope with them. Why not?

In Attachment 2-B, the Committee's specific comments on the scope and contents of the rule, and the staff's presentation at the last CRGR meeting, are included.

### **BACKFIT CONSIDERATIONS**

Spent fuel pool operations part of the proposed rule imposes a new requirement. Therefore, a backfit analysis, in accordance with 10 CFR 50.109, is required; however, no backfit analysis appears to have been done. The Committee recommended Backfit Analysis.

Attachment 2-B to Part I of the Minutes of CRGR Meeting No. 295

CRGR COMMENTS ON PROPOSED 10 CFR 50.67,  
"SHUTDOWN OPERATION AND OPERATIONS INVOLVING  
FUEL STORAGE POOLS AT NUCLEAR POWER PLANTS"

Specific CRGR Comments on the Presentation Material (included herein as Attachment 2-A):

- **Vugraph 1: "Draft Rule, 11/12/96"**
  - \* 50.67(a) - What about pools not associated with light water reactors; e.g., the West Valley and the GE Illinois facilities.
  - \* 50.67(b) - "Shutdown operation...": Immediately after shutdown  $T_{max}$  of reactor pressure vessel water may or may not be below 212°F. Additionally, this seems to imply that between entering mode when shutdown and  $T_{bulk} < 212^\circ\text{F}$ , the existing Technical Specifications are controlling. Is that OK?  
  
Does the criterion  $T_{max} \leq 212^\circ\text{F}$  mean anywhere in the vessel? At the core outlet?
  - \* 50.67(c)(ii) - "... (RCS) pressure must not exceed design pressure, and...": It is unclear what design pressure is intended.
- **Vugraph 2: "Technical specifications appropriately limited in scope"**

What is meant by "appropriately."
- **Vugraph 4: "Shutdown Operation Scope"**

Based on the discussion during the CRGR briefing, it is not clear at what location the temperature measurement will be made, or how  $T_{max}$  is defined.
- **Vugraph 5: "Shutdown Operation Rule"**

Not clear from the discussion at the CRGR meeting if "backup capability" means installation of additional equipment? Does that include the support systems as well? Is GDC-17 applicable?
- **Vugraph 6: "Local  $P_{RCS}$  must not exceed RCS pressure boundary design P and design basis operating limits"**

In shutdown, the RCS design pressure is not limiting. The P-T limits to prevent cold over-pressurization are the governing limits. Why should RCS design pressure be a criterion? If so, which design pressure? For each configuration? Why not just say "... keep within design basis P-T limits including PTS limits.."?
- **Vugraph 8: "Shutdown Operation Backup Capability"**

It is not clear what is meant by "independence." Both core spray and low-pressure core injection in a BWR and low-pressure safety injection and high-pressure safety injection in a PWR have some common element such as power sources. Would these systems meet this new proposed requirement?

- **Vugraph 9: "Shutdown Operation - Containment"**

- \* How do these proposed requirements relate to the current Technical Specifications on containment integrity during refueling?

- \* Are these measures required throughout the shutdown period? If so, how will the licensees perform maintenance or modifications which could make containment inoperable for extended periods.

- **Vugraph 11: "Fuel storage Pool Operation, Rule"**

- \* Comments on "Backup capability" similar to those previously noted.

- \* How is "reasonably achievable" defined.

- **Vugraph 12: "Fuel Storage Pool Operation - Safety Requirements"**

"Adequate level for shielding..." - based on which limits? .....

- **Vugraph 13: "Fuel Storage Pool Operation - Operating Criteria"**

"..provide margin.." - how much?

- **Vugraph 14: "Fuel Storage Pool Operation - Backup Capability"**

- \* First paragraphs appears to be inconsistent with the need for accessibility to refuel floor.

- \* "Consist of two reliable coolant addition systems.." - or paths?

- **Vugraph 15: "Fuel Storage Pool Operation - Fuel Storage Building"**

Again, need definition of "reasonably achievable."

- **Vugraph 17: "Implementation"**

Who will be reviewing this program? What criteria will be used for evaluation? Is the implementation schedule consistent with the scope of modifications necessary implement?

- **Vugraph 18: "Regulatory Analysis for Shutdown Operation"**

- \* Assumptions?

- \* The Regulatory Analysis compares CDF and release with and without the rule. Release may not be a relevant measure, and could possibly be misleading, because release is usually associated with conditions that exist when containment fails following at-power accident. In this case, the reactor is shut down, and there is no energy to drive the release, except initially when there is sufficient decay heat. At other times, the consequences of release would be substantially less than had the accident occurred while the reactor was at power. The figures in the table imply that it is safer to run the plants than to shut them down. Is that so? Some other measures, such as radioactivity released or site boundary dose may be more relevant measures.



## TAC NO. M77701 DRAFT RULE, 11/12/96

### 50.67 Shutdown Operation and Operations Involving Fuel Storage Pools at Nuclear Power Plants

(a) Applicability. This section applies to all holders of operating licenses or combined licenses for a light-water reactor nuclear power plant, and to all holders of licenses authorizing storage or movement of fuel in a fuel storage pool at a light-water reactor nuclear power plant.

(b) Definitions. For the purpose of this section:

*Shutdown operation* encompasses the nuclear steam supply system, the containment, and any systems necessary for the operation of the nuclear steam supply system and containment; while the reactor is subcritical, one or more fuel assemblies are located in the reactor vessel or in the refueling cavity, and the maximum temperature of water in the reactor vessel ( $T_{max}$ ) is  $< 212$  °F. In addition, *shutdown operation* includes operation after an inadvertent event, initiated while  $T_{max}$  is  $< 212$  °F, that has resulted in either  $T_{max} \geq 212$  °F or criticality.

*Fuel storage pool operation* encompasses the fuel storage pool, the fuel storage building, and any systems necessary for the operation of the fuel storage pool and the fuel storage building, while one or more fuel assemblies are located in the fuel storage pool or connected water-filled cavities and any of the following conditions exist:

(i) Any part of the surface of the fuel storage pool water may reach saturation temperature within 48 hours following a total loss of fuel storage pool heat removal systems.

(ii) Any operations are in progress that have the potential to cause a substantial loss of water from the fuel storage pool.

(c) During *shutdown operation*, holders of operating licenses or combined licenses for a light-water reactor nuclear power plant shall:

(1) Comply with the following requirements:

(i)  $T_{max}$  must be  $< 212$  °F.

(ii) Local reactor coolant system (RCS) pressure must not exceed the design pressure, and must not exceed the design basis operating limits, of the RCS pressure boundary (including any temporary closure that is part of the RCS pressure boundary).

(iii) Local RCS water level must be sufficient to ensure reliable operation of all means of core cooling that are credited to meet the requirements of Paragraph (c) of this section.

## TAC NO. M77701 DRAFT RULE, 11/12/96

(iv) Shutdown margin must be greater than or equal to the values that are determined in accord with NRC-approved methods.

(v) During and following cases of noncompliance with the above requirements of Paragraph (c)(1) of this section, with the exception of actions necessary for safety, no *shutdown operations* shall be conducted until authorized by the Commission.

(vi) Provide sufficient equipment, supporting systems, instrumentation, procedures, training, and personnel to ensure compliance with the safety requirements in a reliable manner.

(2)(i) Establish operating criteria for *shutdown operation* that represent licensee-determined goals that provide an operating margin with respect to the requirements of Paragraph (c)(1)(i) through (iv), inclusive, of this section.

(ii) Monitor against the operating criteria in a manner to meet the requirements of Paragraph (c)(1)(i) through (iv), inclusive, of this section, and, if one or more of the operating criteria are not met, then immediately implement actions to restore operation within the operating criteria.

(3) Provide, and as necessary operate, a two-system backup capability that will remain sufficiently functional with respect to the potential impact of postulated internal and external events; with sufficient supporting systems, independence, reliability, instrumentation, procedures, training, and personnel; to maintain water level above the top of the fuel and maintain the fuel cladding in a wetted condition.

(4) Provide a containment barrier to the extent that is reasonably achievable to (i) minimize the potential release of radioactive material and (ii) that will remain sufficiently functional with respect to the potential impact of postulated internal and external events. *(including a loop)*

(d) During *fuel storage pool operation*, holders of operating licenses or combined licenses for a light-water reactor nuclear power plant shall, when one or more fuel assemblies are located in the fuel storage pool:

(1) Comply with the following fuel storage pool requirements:

(i) The fuel storage pool water temperature must remain below local saturation temperature everywhere in the pool, and water temperature at the surface of the fuel storage pool must remain subcooled after a total loss of forced residual heat removal systems for the period of time necessary to initiate operation of the backup system required by Paragraph (d)(3) of this section.

## TAC NO. M77701 DRAFT RULE, 11/12/96

(ii) The water level in the fuel storage pool must remain sufficient for reliable operation of the means of pool cooling used to meet the requirements of Paragraph (d)(1)(i) of this section and must provide sufficient shielding for the conduct of operations necessary for safety.

(iii) The effective neutron multiplication factor within the fuel storage pool and connected water-filled cavities, exclusive of the refueling cavity and reactor vessel, must remain no greater than 0.95.

(2) Establish operating criteria that represent licensee-determined goals that provide an operating margin with respect to the requirements of Paragraph (d)(1) of this section, monitor against the operating criteria in a manner to meet the requirements of Paragraph (d)(1) of this section, and, if the operating criteria are not met, then immediately implement actions to restore operation within the operating criteria.

(3) Provide, and as necessary operate, a reliable backup capability that is sufficiently independent of systems and components used to maintain conditions in the fuel storage pool within the criteria of Paragraph (d)(1) of this section, to:

(i) maintain water level above the top of irradiated fuel assemblies,

(ii) maintain fuel cladding in a wetted condition, and

(iii) control the environment within the structure surrounding the fuel storage pool to the extent necessary to prevent a loss of equipment and operator function necessary to (1) bring any nuclear reactor at the site to a safe shutdown and to maintain it in a safe-shutdown condition, and (2) support continued residual heat removal from any irradiated fuel in the fuel storage pool.

(4) Provide a containment barrier to the extent that is reasonably achievable to (i) minimize the potential release of radioactive material and (ii) that will remain sufficiently functional with respect to the potential impact of postulated internal and external events.

(e) Reporting. Holders of operating licenses or combined licenses for a light-water reactor nuclear power plant shall:

(1) Report any noncompliance with the requirements of Paragraphs (c)(1)(i) through (iv), inclusive, and of (d)(1) of this section in accord with Paragraph (b)(1) of Section 50.72, "One hour reports."

## TAC NO. M77701 DRAFT RULE, 11/12/96

(2) Report any noncompliance with Paragraphs (c)(1)(v) and (vi) of this section, and report any actuation of the backup capability required by Paragraphs (c)(3) or (d)(3) of this section for the purpose of mitigating an event, to satisfy the requirements of Paragraphs (c)(1) or (d)(1) of this section, or to satisfy the operating criteria of Paragraphs (c)(2) or (d)(2) of this section, in accord with Paragraph (b)(2) of Section 50.72, "Four-hour reports."

(3) Report any noncompliance with providing or using (i) the backup capability required by Paragraphs (c)(3) or (d)(3) of this section, or (ii) the containment and the fuel handling building required by Paragraphs (c)(4) or (d)(4) of this section, in accord with Paragraph (b)(2) of Section 50.72, "Four-hour reports."

(4) Report any noncompliance with, or failure to meet the requirements of, this section in accord with Paragraph (a) of Section 50.73, "Reportable events" (30-day Licensee Event Report).

(5) Review any event for which a report is required under Paragraph (e) of this section and record the results of the review, including the cause of the condition and the basis for corrective action taken to preclude recurrence. Licensees in these cases shall retain the records of the review for a period of three years following issuance of a Licensee Event Report.

(f) Implementation. Each licensee shall:

(1) Update its Final Safety Analysis Report to describe the hardware, programs, and procedures that will be utilized to comply with this section.

(2) Implement the requirements of this section by no later than the first scheduled outage after [INSERT DATE OF FINAL RULE PLUS 12 MONTHS].

PROPOSED §50.67

"SHUTDOWN OPERATION AND  
OPERATIONS INVOLVING FUEL  
STORAGE POOLS AT  
NUCLEAR POWER PLANTS"

NOVEMBER 12, 1996

## **BACKGROUND — SHUTDOWN OPERATION**

- **LONG HISTORY OF EVENTS AND PROBLEMS**
- **NRC PUBLISHED RULE FOR COMMENT ON  
OCTOBER 19, 1994 IN FEDERAL REGISTER**
- **RESPONSES IDENTIFIED MANY PROBLEMS  
WITH PROPOSED RULE**
- **RULE AND SUPPORTING DOCUMENTS HAVE  
BEEN COMPLETELY REWRITTEN**
- **COMPREHENSIVE REGULATORY ANALYSIS  
HAS BEEN PERFORMED**

## **BACKGROUND — FUEL STORAGE POOL OPERATION**

- **DESIGN BASIS FOR POOL COOLING AND  
INVENTORY CONTROL POORLY DEFINED**
- **TECHNICAL SPECIFICATIONS  
APPROPRIATELY LIMITED IN SCOPE**

## RULEMAKING OBJECTIVES – SHUTDOWN OPERATION

- MINIMIZE OCCURRENCE OF POTENTIALLY SERIOUS EVENTS
- ENSURE CAPABILITY TO MITIGATE EVENTS THAT DO OCCUR

## RULEMAKING OBJECTIVES – FUEL STORAGE POOL OPERATION

- CLARIFY REGULATORY REQUIREMENTS
- ENHANCE OPERATIONAL FLEXIBILITY
- ENSURE CAPABILITY TO MITIGATE EVENTS THAT DO OCCUR *none to potential specific events etc. from the TUS Team & PS*

## SHUTDOWN OPERATION - SCOPE

### COVERS:

- NUCLEAR STEAM SUPPLY SYSTEM (NSSS), CONTAINMENT, SYSTEMS NECESSARY FOR OPERATION OF NSSS AND CONTAINMENT

### WHEN:

- REACTOR SUBCRITICAL
- MAXIMUM REACTOR VESSEL (RV) WATER TEMPERATURE ( $T_{\max}$ )  $< 212$  °F
- ONE OR MORE FUEL ASSEMBLIES IN RV OR REFUELING CAVITY

### IN ADDITION, COVERS:

- INADVERTENT EVENT INITIATED WHEN  $T_{\max} < 212$  °F THAT HAS RESULTED IN  $T_{\max} \geq 212$  °F OR CRITICALITY



## **FOR SHUTDOWN OPERATION, RULE:**

- **SETS SAFETY REQUIREMENTS FOR TEMPERATURE, LEVEL, PRESSURE, AND SHUTDOWN MARGIN**
- **ADDRESSES NONCOMPLIANCE WITH SAFETY REQUIREMENTS**
- **REQUIRES LICENSEES TO PROVIDE SUFFICIENT EQUIPMENT, PROCEDURES, AND TRAINED PERSONNEL TO ENSURE SAFETY REQUIREMENTS ARE MET**
- **REQUIRES LICENSEES TO OPERATE WITHIN LICENSEE-SET OPERATING CRITERIA**
- **REQUIRES A BACKUP CAPABILITY TO BE AVAILABLE TO COOL THE FUEL (IN ADDITION TO RESOURCES COMMITTED TO MEET SAFETY REQUIREMENTS)**
- **REQUIRES AN AVAILABLE CONTAINMENT**
- **ESTABLISHES REPORTING AND IMPLEMENTATION REQUIREMENTS**

## SHUTDOWN OPERATION — SAFETY REQUIREMENTS

- (i)  $T_{\max} < 212 \text{ }^{\circ}\text{F}$  *most exigent level/height, BWRS, instr.*
- (ii) LOCAL  $P_{\text{RCS}}$  MUST NOT EXCEED RCS PRESSURE BOUNDARY DESIGN P AND DESIGN BASIS OPERATING LIMITS
- (iii) LOCAL RCS WATER LEVEL SUFFICIENT TO ENSURE RELIABLE CORE COOLING
- (iv) SHUTDOWN MARGIN  $\geq$  VALUES DETERMINED BY NRC-APPROVED METHODS

### RELATED REQUIREMENTS

- (v) DURING AND FOLLOWING NONCOMPLIANCE WITH (i) - (iv) — OPERATIONS SHALL BE RESTRICTED TO THOSE NECESSARY FOR SAFETY UNTIL NRC AUTHORIZES CONTINUED OPERATION
- (vi) LICENSEES SHALL PROVIDE SUFFICIENT EQUIPMENT, SUPPORTING SYSTEMS, INSTRUMENTATION, PROCEDURES, TRAINING, AND PERSONNEL TO ENSURE COMPLIANCE WITH (i) - (iv)

## SHUTDOWN OPERATION — OPERATING CRITERIA

### LICENSEES SHALL:

- ESTABLISH OPERATING CRITERIA THAT PROVIDE MARGIN TO (i) - (iv)
- MONITOR AGAINST CRITERIA IN A MANNER TO MEET (i) - (iv)
- IF CRITERIA NOT MET, IMMEDIATELY TAKE ACTION TO RESTORE OPERATION TO WITHIN OPERATING CRITERIA

## SHUTDOWN OPERATION — BACKUP CAPABILITY

LICENSEES SHALL PROVIDE A BACKUP CAPABILITY TO MAINTAIN WATER LEVEL ABOVE THE TOP OF THE FUEL AND MAINTAIN FUEL CLADDING IN A WETTED CONDITION

IT SHALL:

- CONSIST OF TWO SYSTEMS WITH SUFFICIENT:
  - . SUPPORTING SYSTEMS
  - . INDEPENDENCE
  - . RELIABILITY
  - . INSTRUMENTATION
  - . PROCEDURES
  - . TRAINING
  - . PERSONNEL
- REMAIN SUFFICIENTLY FUNCTIONAL WITH RESPECT TO INTERNAL AND EXTERNAL EVENTS

## SHUTDOWN OPERATION - CONTAINMENT

LICENSEES SHALL PROVIDE A CONTAINMENT BARRIER TO THE EXTENT THAT IS REASONABLY ACHIEVABLE:

- TO MINIMIZE POTENTIAL RELEASE OF RADIOACTIVE MATERIAL
- THAT WILL REMAIN SUFFICIENTLY FUNCTIONAL WITH RESPECT TO INTERNAL AND EXTERNAL EVENTS

# FUEL STORAGE POOL OPERATION - SCOPE

## COVERS:

- FUEL STORAGE POOL, FUEL STORAGE BUILDING, SYSTEMS NECESSARY FOR OPERATION OF FUEL STORAGE POOL AND BUILDING

## WHEN:

- IRRADIATED FUEL IS IN STORAGE POOL,

AND EITHER

- TIME TO BOIL IS LESS THAN 48 HOURS

OR

- OPERATIONS WITH POTENTIAL TO DRAIN POOL ARE IN PROGRESS

## FOR FUEL STORAGE POOL OPERATION, RULE:

- SETS SAFETY REQUIREMENTS FOR TEMPERATURE, LEVEL, AND SHUTDOWN MARGIN [REQUIREMENTS BASED IN PART ON BACKUP CAPABILITY PROVIDED]
- REQUIRES LICENSEES TO OPERATE WITHIN LICENSEE-SET OPERATING CRITERIA
- REQUIRES A BACKUP CAPABILITY TO BE AVAILABLE TO (1) COOL THE STORED FUEL AND (2) ALLOW FOR OPERATIONS THAT ARE NECESSARY TO CONTINUE COOLING STORED FUEL AND SHUT DOWN REACTOR(S)
- REQUIRES USE OF FUEL BUILDING TO CONTAIN RADIOACTIVE MATERIAL TO THE EXTENT REASONABLY ACHIEVABLE
- ESTABLISHES REPORTING AND IMPLEMENTATION REQUIREMENTS

## FUEL STORAGE POOL OPERATION — SAFETY REQUIREMENTS

- (i) SUBCOOLED DECAY HEAT REMOVAL FOR PERIOD OF TIME AFTER LOSS OF PRIMARY COOLING NECESSARY TO IMPLEMENT BACKUP COOLING CAPABILITY
  
- (ii) ADEQUATE LEVEL FOR SHIELDING TO IMPLEMENT BACKUP COOLANT ADDITION CAPABILITY AND FOR SUBCOOLED DECAY HEAT REMOVAL SYSTEM OPERATION
  
- (iii)  $k_{\text{EFF}} < 0.95$



## FUEL STORAGE POOL OPERATION — OPERATING CRITERIA

### LICENSEES SHALL:

- ESTABLISH OPERATING CRITERIA THAT PROVIDE MARGIN TO (i) - (iii)
- MONITOR AGAINST CRITERIA IN A MANNER TO MEET (i) - (iii)
- IF CRITERIA NOT MET, IMMEDIATELY TAKE ACTION TO RESTORE OPERATION TO WITHIN OPERATING CRITERIA

## FUEL STORAGE POOL OPERATION — BACKUP CAPABILITY

LICENSEES SHALL PROVIDE A BACKUP CAPABILITY TO MAINTAIN WATER LEVEL ABOVE THE TOP OF THE FUEL, MAINTAIN FUEL CLADDING IN A WETTED CONDITION, AND CONTROL THE ENVIRONMENT SUCH THAT CONTINUED DECAY HEAT REMOVAL WILL NOT BE THREATENED

THE BACKUP CAPABILITY SHOULD:

- CONSIST OF TWO RELIABLE COOLANT ADDITION SYSTEMS AND ONE METHOD OF TRANSFERRING DECAY HEAT TO AN ULTIMATE HEAT SINK
- REMAIN SUFFICIENTLY FUNCTIONAL WITH RESPECT TO SPECIFIED EVENTS POTENTIALLY INVOLVING A LOSS OF COOLING OR LOSS OF COOLANT INVENTORY

**FUEL STORAGE POOL OPERATION -  
FUEL STORAGE BUILDING**

**LICENSEES SHALL PROVIDE A CONTAINMENT  
BARRIER TO THE EXTENT THAT IS  
REASONABLY ACHIEVABLE TO MINIMIZE  
POTENTIAL RELEASE OF RADIOACTIVE  
MATERIAL**

## REPORTING

### ONE HOUR §50.72 REPORT —

- NONCOMPLIANCE WITH SAFETY REQUIREMENTS

### FOUR HOUR §50.72 REPORT — NONCOMPLIANCE WITH REQUIREMENTS FOR:

- RESOURCES FOR SHUTDOWN OPERATION
- BACKUP CAPABILITY
- CONTAINMENT

### 30 DAY §50.73 REPORT (LER) FOR —

- ANY OF THE ABOVE
- FAILURE TO OPERATE WITHIN OPERATING CRITERIA

### FOR ANY EVENT THAT REQUIRES A §50.73 REPORT, LICENSEES SHALL —

- REVIEW THE EVENT
- INCLUDE CAUSE OF THE CONDITION
- INCLUDE BASIS FOR CORRECTIVE ACTION
- RECORD THE RESULTS OF THE REVIEW

## IMPLEMENTATION

- DESCRIBE HARDWARE, PROGRAMS, AND PROCEDURES IN UPDATE TO FSAR
- IMPLEMENT BY NO LATER THAN FIRST SCHEDULED OUTAGE THAT IS 12 MONTHS OR MORE AFTER DATE OF PUBLICATION OF FINAL RULE

# REGULATORY ANALYSIS FOR SHUTDOWN- OPERATION

## CALCULATED CORE DAMAGE AND RELEASE FREQUENCIES

Alternative	PWR, per r-y		BWR, per r-y	
	CDF	Release	CDF	Release
Base: Present regulations, TSs, assumed realistic operations	4E-4	4E-4	2E-5	2E-5
Rule: Operations with proposed rule implemented	3E-6	3E-7	6E-7	5E-7

## IMPACT/VALUE SUMMARY

Item	PWR	BWR
Net Value, \$M	1,197	3
Impact/value (dimensionless)	0.04	0.83

# REGULATORY ANALYSIS FOR SHUTDOWN OPERATION

## UNCERTAINTY STUDY RESULTS – CDF

Item	PWR		BWR	
	Rule Case	Base Case	Rule Case	Base Case
Mean	3.4E-06	4.5E-04	5.8E-07	2.3E-05
5 <sup>th</sup> Percentile	6.0E-07	6.9E-05	1.3E-07	4.7E-06
50 <sup>th</sup> Percentile (Median)	2.1E-06	2.5E-04	4.3E-07	1.6E-06
95 <sup>th</sup> Percentile	9.3E-06	1.3E-03	1.5E-06	6.1E-05

A SENSITIVITY STUDY WAS CONDUCTED THAT INVESTIGATED MORE THAN 80 VARIATIONS. WITH RESPECT TO NET VALUE, THE MOST IMPORTANT VARIABLE WAS OUTAGE TIME:

Change in outage time due to implementation of rule	Net Value, \$M	
	PWR	BWR
Increase one day	476	-348
No change	1,197	3
Decrease one day	1,919	355