POLICY ISSUE
(Notation Vote)

January 31, 2011 SECY-11-0014

FOR: The Commissioners

FROM: R. W. Borchardt
Executive Director for Operations

SUBJECT: USE OF CONTAINMENT ACCIDENT PRESSURE IN ANALYZING EMERGENCY CORE COOLING SYSTEM AND CONTAINMENT HEAT REMOVAL SYSTEM PUMP PERFORMANCE IN POSTULATED ACCIDENTS

PURPOSE:

The purposes of this paper are to: (i) respond to the staff requirements memorandum (SRM) concerning the U.S. Nuclear Regulatory Commission's (NRC's) meeting with the Advisory Committee on Reactor Safeguards (ACRS), dated June 25, 2010 (SRM M100609B), and (ii) request Commission approval of the staff's plan to resolve issues regarding the use of containment accident pressure (CAP) in analyzing pump performance in emergency core cooling systems (ECCSs) and containment heat removal systems during postulated accidents. These issues arise from continuing discussions between the NRC staff (staff) and ACRS.

SUMMARY:

The staff has developed options for addressing the issues on CAP. The staff recommends the first option, which is to resume review of the two license amendment requests currently on hold because of the issues on CAP, and to use its existing risk review guidance, including the review

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guidance for nonrisk-informed applications, consistent with the existing direction from the Commission and the staff's recently-developed deterministic guidance for future CAP reviews.

In SRMs regarding two meetings with ACRS, on June 5, 2008 (SRM M080605B), and November 7, 2008 (SRM M081107), the Commission directed the staff to continue working to resolve differences between ACRS and the staff concerning the use of CAP in demonstrating that pumps in ECCSs and containment heat removal systems can perform their safety function(s). In the most recent SRM on this subject (SRM M100609B), the Commission directed the staff to discuss the areas in which it "aligns with the ACRS and disagrees with the ACRS" with regard to the use of CAP, including defense-in-depth implications, the use of risk information, and whether to assess the practicability of plant modifications to eliminate the need for CAP credit.

The remainder of this paper discusses these areas and the options for addressing the overall CAP issue. Enclosure 1 provides a regulatory history of the CAP issue and technical and regulatory information on the use of CAP in reactor safety analyses. It forms the basis upon which the staff is ready to proceed with the recommended approach. Enclosure 2 discusses areas of agreement and disagreement between the staff and ACRS other than the three issues specifically identified in SRM M100609B. The staff addresses those three issues in this paper.

BACKGROUND:

The accident analyses for many operating reactors rely on pressure higher than that present before the postulated accident to provide net positive suction head (NPSH) margin for the pumps in the ECCS and the containment heat removal system. NPSH margin is a measure of the pumps ability to avoid excessive cavitation so that it can perform its safety function(s). Section 2.0 of Enclosure 1 to this paper describes NPSH and cavitation in more detail.

In calculating NPSH margin, the inclusion of some or all of the pressure developed in the containment during an accident is referred to as CAP credit. The staff earlier used the term "containment overpressure" for this issue but discontinued its use for two reasons: (1) industry uses several definitions of containment overpressure, and (2) the term has been confused with exceeding the design pressure of the containment. The containment design pressure is never exceeded while crediting CAP.

The total containment accident pressure is made up of two partial pressures: the partial pressure of the water vapor and the partial pressure of the heated air or nitrogen present in the containment atmosphere before the postulated accident. For pressurized water reactors (PWRs), the vapor pressure during a loss-of-coolant accident (LOCA) (determined by the sump water temperature) is predicted to be greater than the total containment pressure before the postulated accident. This vapor pressure is credited to demonstrate adequate NPSH margin. Some PWRs also credit a portion of the air partial pressure to ensure adequate NPSH margin. For boiling water reactors (BWRs) both the partial pressure of the vapor in the containment atmosphere and the air partial pressure are used to demonstrate adequate NPSH margin for the LOCA and certain "special events" (station blackout, anticipated transients without scram, and safe shutdown following fires). The amount of CAP credited and its duration depend on pump and system characteristics. These vary from plant to plant.

Overview of Regulatory History

Some early reactor designs credited CAP in calculating NPSH margin. In response to an ACRS recommendation to discontinue this practice, the NRC issued Regulatory Guide (RG) 1.1, "Net Positive Suction Head for Emergency Core Cooling and Containment Heat Removal System Pumps," in November 1970 (Agencywide Documents Access and Management System (ADAMS) Accession No. ML052440069). The position in RG 1.1 is that the containment pressure used to determine NPSH margin should be the pressure in containment before the accident. However, the NRC did not backfit this position on plants that were already licensed with credit for CAP, and the staff allowed credit for CAP throughout the years because of various operating reactor conditions and in response to specific technical issues. (See Section 4.2 of Enclosure 1).

The guidance in RG 1.82, "Water Sources for Long-Term Recirculation Cooling following a Loss-of-Coolant Accident," Revision 3, issued November 2003 (ADAMS Accession No. ML033140347), retained the regulatory position in RG 1.1 (i.e., the ECCS and the containment heat removal system should be designed to provide sufficient NPSH margin without any increase in containment pressure from that present before the accident). However, RG 1.82, Revision 3, also recognizes that some operating nuclear power plants for which modifications to avoid crediting CAP are impracticable, may need CAP credit to demonstrate adequate NPSH margin.

Extent of CAP Credit

The table below provides the current status of the use of CAP for operating reactors.

Status of Use of Containment Accident Pressure for Currently-Operating Reactors		
	Pressurized Water Reactors	Boiling Water Reactors
RG 1.1 position met	9	16
RG 1.1 position not met	60	19

Interactions between the Staff and the Advisory Committee on Reactor Safeguards

Although licensees have taken credit for CAP in various license amendments submitted in recent years, ACRS and the staff have focused their discussions on license amendment requests for extended power uprates (EPUs). A power uprate increases the decay heat level following a reactor trip. This results in an increase in the temperature of the sump water (PWRs) or suppression pool water (BWRs). This reduces the NPSH margin.

The staff has discussed the use of CAP with ACRS on many occasions, both generically and as it applies to specific operating reactors. Section 4.2 of Enclosure 1 summarizes the discussions since 1997.

Enclosure 2 summarizes areas of agreement and disagreement between the staff and ACRS other than the three topics explicitly mentioned in SRM M100609B. The staff has implemented several ACRS recommendations. The ACRS letter, "Crediting Containment Overpressure in

Meeting the Net Positive Suction Head Required to Demonstrate that the Safety Systems Can Mitigate the Accidents as Designed," dated March 18, 2009, to the NRC Executive Director for Operations (EDO) (ADAMS Accession No. ML090700464) recommends that, if the amount of CAP that must be credited based on licensing analyses is not a small fraction of the total CAP and limited in duration (amount and duration both not defined), the licensee should provide additional information to address conservatisms and explicitly account for uncertainties. In consultation with two pump industry experts on NPSH and cavitation, the staff developed interim staff guidance that quantifies uncertainty and margin in using CAP. (See Section 6.0 of Enclosure 1). The staff discussed this interim staff guidance with ACRS at the 572nd ACRS meeting on May 6, 2010. The staff also transmitted this guidance to the BWR Owners' Group (BWROG) (ADAMS Accession No. ML100550903) and the PWR Owners' Group (ADAMS Accession No. ML100740516) for their comment. ACRS stated, in the May 19, 2010, letter, "Draft Guidance on Crediting Containment Accident Pressure in Meeting the Net Positive Suction Head Required to Demonstrate that Safety Systems Can Mitigate Accidents as Designed," to the NRC EDO (ADAMS Accession No. ML101300332), that this guidance "provides an improved framework for a more comprehensive assessment of crediting containment accident pressure in meeting NPSH requirements."

At the staff's request, BWROG developed a statistical method for analyzing the use of CAP for BWRs that also quantifies the NPSH margin. A BWROG topical report (ADAMS Accession No. ML080520261) describes this method. The staff and BWROG discussed this report with ACRS at the 572nd ACRS meeting. BWROG may revise this topical report to include the recently-developed deterministic staff guidance.

The staff also performed a generic risk analysis of a BWR with a Mark I containment. The results show that the risk increase caused by using CAP is very small. (See Section 5.5 of Enclosure 1 and the transcript of the May 6, 2010, ACRS meeting). The May 19, 2010, ACRS letter stated that "the PRA [probabilistic risk assessment] studies by the staff are helpful in assessing the importance of pre-initiator and post-initiator leak probability and leakage test interval on the changes in risk associated with CAP credit." ACRS noted that the staff analysis did not include postulated accidents initiated by seismic events, operator actions that could affect CAP, or fires.

DISCUSSION:

The Commission requested a discussion of three issues related to the use of CAP for which the staff and ACRS are not in agreement. Issue 1 addresses defense-in-depth as it relates to this issue because it represents the fundamental consideration in the use of CAP. Issue 2 concerns the use of risk information to judge the acceptability of CAP credit. Finally, Issue 3 discusses whether the staff should consider the practicability of hardware modifications to eliminate the need for CAP credit.

Issue 1: Application of CAP with Respect to Defense-in-Depth

The staff understands the ACRS position on defense-in-depth, which is to maintain the independence of the containment function and the accident mitigation function by not relying on containment accident pressure (transcript of NRC Commission meeting with the ACRS, June 9, 2010 (ADAMS Accession No. ML101660107), p. 31).

Defense-in-depth is a basic element of the NRC's safety philosophy. Defense-in-depth has been applied in various forms. One application of defense-in-depth is to ensure that key safety functions do not depend on a single element of design, construction or operation. Another form of the defense-in-depth philosophy is a balance among accident prevention, accident mitigation and the limitation of the consequences of an accident. Redundant and diverse means may be used to accomplish key safety functions. One manifestation of defense-in-depth is the use of multiple independent fission product barriers.

Regulatory Guide 1.174, "An Approach for Using Probabilistic Risk Assessment in Risk-Informed Decisions on Plant-Specific Changes to the Licensing Basis," issued July 1998, provides guidance on the evaluation of defense-in-depth attributes in the review of risk-informed license amendment requests. One of these attributes is that "the independence of barriers is not degraded." However, the regulations do not specify that the fission product barriers be independent.

The use of CAP credit for ECCS and containment heat removal pump NPSH margin has the potential to create a dependency between the containment and another fission product barrier (the fuel cladding) because containment leakage, sufficiently greater than that allowed by technical specifications, could result in insufficient CAP and failure of the ECCS and containment heat removal pumps to perform their safety functions because of excessive cavitation. This pump failure could, in turn, lead to core damage.

A dependency between fission product barriers created by the use of CAP credit may adversely impact defense-in-depth. First, the key safety function of providing abundant emergency core cooling operation depends, for many plant designs, on an intact containment as a source of water (e.g., suppression pools for BWRs; containment sumps for PWRs during the recirculation phase). Failing the containment in a manner that would prevent use of this water (e.g., a failure at the bottom of a BWR suppression pool) could impair the ECCS function. The need for CAP credit could increase the level of dependency between the containment and the ECCS. This would be a reduction in defense-in-depth because a single element of the design (i.e., the containment) is relied upon to ensure this key safety function.

An increase in dependence between the containment and the ECCS could also affect the balance among accident prevention, accident mitigation, and limiting accident consequences. Crediting CAP would have no impact on accident initiation, but containment failure could impair the ability of the ECCS to mitigate the accident. Accident consequences as determined by design-basis calculations could also be adversely impacted by CAP credit, because the failure of containment could not only result in fuel failure but also reduction in the effectiveness of the final fission product barrier.

Appendix A, "General Design Criteria for Nuclear Power Plants," to Title 10 of the *Code of Federal Regulations* (10 CFR) Part 50, "Domestic Licensing of Production and Utilization Facilities," reflects the defense-in-depth principles, although Appendix A does not explicitly refer to defense-in-depth. A balance among accident prevention, accident mitigation, and limiting accident consequences is basic to the general design criteria. Specific requirements in the general design criteria exist for independence, redundancy, and diversity (oftentimes achieved by imposing the requirement to withstand a "single failure)." The general design criteria also require a level of quality commensurate with the safety functions of structures, systems, and components and require the capability for inspection and testing. These requirements ensure

that the individual fission product barriers are capable of performing their safety functions. However, the general design criteria do not explicitly require the independence of fission product barriers, and CAP credit does not contravene any general design criterion.

The regulation at 10 CFR 50.48, "Fire protection," characterizes defense-in-depth for fire protection, and 10 CFR 50.69, "Risk-informed categorization and treatment of structures, systems, and components for nuclear power reactors," mentions defense-in-depth but does not define it.

The International Atomic Energy Agency publication INSAG-10, "Defense in Depth in Nuclear Safety," (issued 1996), describes the implementation of defense-in-depth and illustrates how its various elements interrelate. INSAG-10 implements the defense-in-depth philosophy consistent with 10 CFR Part 50 of the NRC's regulations. INSAG-10 also does not specify the independence of fission product barriers. Instead, it states that, for situations in which the fission product barriers are not fully independent, their reliability should be greater.
As discussed in Section 5.1 of Enclosure 1, great care is taken to ensure the integrity (leak tightness) of the containment in design, construction and operation. For this reason, containment integrity is assumed in all design-basis accident analyses. The consideration of containment failure implies a beyond-design-basis accident. Several instances of containment structure degradation have occurred over the past 25 years, and a number of NRC generic communications and reports have addressed them. Most of the recent events have involved localized corrosion of the carbon steel liner of concrete containments, some with (liner) through-wall penetration, although with very small measured or calculated leakage. None of the events involved a loss of containment design function, including leak tightness assumed in the dose analyses. The NRC staff continues to monitor the industry response to these events, especially with regard to inspection methods and frequency.

In fact, several regulations assume the integrity of the containment to satisfy important safety limits. For example, Appendix K, "ECCS Evaluation Models," to 10 CFR Part 50 credits containment pressure in LOCA calculations. This assumes containment integrity. The offsite dose limits in 10 CFR Part 100, "Reactor Site Criteria," or 10 CFR 50.67, "Accident source term," might not be met following a LOCA if the containment leakage rate is greater than the very small leakage rate specified in Appendix J, "Primary Reactor Containment Leakage Testing for Water-Cooled Power Reactors," to 10 CFR Part 50. This small leakage rate implies containment integrity.

Section 4.1 of Enclosure 1 discusses defense-in-depth in NRC regulations and the application of defense-in-depth to reactor safety in other documents.

Issue 2: Use of Risk Information to Assess Appropriateness of CAP Credit

The staff understands the ACRS position on risk to be that, if hardware modifications are impractical to eliminate the need for CAP, then the defense-in-depth margins that are involved in allowing CAP credit should be relaxed only if the associated increase in risk is small. The risk assessment should be plant-specific, should consider the risk from fire and seismic as well as internal events, and should consider the possibility of operator errors that could affect CAP (transcript of NRC Commission meeting with the ACRS, June 9, 2010 (ADAMS Accession No. ML101660107), pp. 32, 34).

The Issue 1 discussion states that the use of CAP credit potentially affects defense-in-depth by increasing the level of dependence between the fuel cladding and the containment. Risk information could be used as a measure of the significance of reducing the independence of fission product barriers because of CAP in a given license amendment request. A PRA approach could be used to assess the increase in risk that could result from a failure of containment that disabled the ECCS by removing the needed CAP. A PRA is ideally suited to assess the balance among accident prevention, mitigation, and consequences. However, no NRC regulation requires licensees to provide risk information related to crediting CAP as part of the basis for supporting an amendment to a Part 50 operating license.

In fact, license amendment requests crediting CAP are typically not risk-informed (i.e., submitted in accordance with the guidance in RG 1.174). SRP Section 19.2, Appendix D, requires the NRC staff to find "special circumstances that could rebut the presumption of adequate protection" to require risk analysis for nonrisk-informed license amendment requests. The staff submitted this approach to the Commission in SECY-99-246, "Proposed Guidelines for Applying Risk-Informed Decision Making in License Amendment Reviews," dated October 19, 1999. The Commission approved the staff recommendation and provided additional implementation guidance in its related SRM.

ACRS recommends a plant-specific PRA to justify the use of CAP for NPSH margin. In crediting CAP, the staff has not identified special circumstances that could rebut the presumption of adequate protection afforded by compliance with the regulations. This is supported, in part, by a generic risk analysis that the staff performed on a BWR with a Mark I containment. This assessment concluded that the risk of using CAP for this plant is very small. (See Section 5.5 of Enclosure 1). Therefore, the staff has no basis within the current regulations or established Commission policy to require licensees to perform a plant-specific PRA to support crediting CAP. However, if the NRC can demonstrate that there is a need, justifiable on both technical and backfitting grounds, for requesting risk information in order to make a regulatory decision on the licensee's request to use CAP, then the NRC may request a risk analysis assessing the use of CAP to address licensee-initiated license amendments that depend upon CAP (or an extension of CAP to new applications)

Issue 3: Practicability of Hardware Changes to Eliminate CAP Credit

The staff understands the ACRS position on practicability to be that licensees should be required to demonstrate, on a plant-specific basis, that it is not practical to reduce or eliminate the need for overpressure credit by hardware changes or requalification of equipment before NRC would consider granting CAP credit (transcript of NRC Commission meeting with the ACRS, June 9, 2010 (ADAMS Accession No. ML101660107), p. 31).

RG 1.82, Revision 3, includes a regulatory position that ECCSs and containment heat removal systems should be designed to provide sufficient available NPSH to the system pumps, assuming the maximum expected temperature of pumped fluid and no increase in containment pressure from that present before the postulated LOCA. The regulatory position also states that this may not be possible for certain operating reactors for which the design cannot be practicably altered. RG 1.82, Revision 3, allows CAP credit in such cases, if supported by an acceptable technical analysis.

The issue is whether the staff should make judgments about the practicability of plant modifications to avoid using CAP credit in NPSH margin calculations.

The NRC staff reviews license amendment requests and performs a safety evaluation based on regulations, regulatory guidance, and Commission policy. The staff does not judge whether the licensee could have met its objective in some other way. The staff only evaluates the safety of the licensee's proposal. This is consistent with 10 CFR 50.109, "Backfitting." Even when the NRC imposes a backfit, the licensee is ordinarily free to choose a compliance option that best suits its purposes (10 CFR 50.109(a)(7)).

New Reactors

In SRM SECY-06-0144, "Proposed Reorganization of the Office of Nuclear Reactor Regulation and Region II," dated July 21, 2006, the Commission directed the staff to consistently apply technical and regulatory standards, guides, and requirements both to new plant licensing and to operating plants and to look for other strategies, as appropriate, to achieve and maintain the desired consistency.

The only new reactor designs that have credited CAP to demonstrate adequate NPSH margin are the active PWR designs. Passive plants do not rely on active pumping systems, and the active BWR has not taken credit for containment pressure greater than the pressure before the postulated accident in NPSH analyses.

Active PWR designs for new reactors take a similar approach to the use of CAP in evaluating NPSH as operating PWR designs do. For example, both operating PWRs and new active PWR designs predict elevated sump water temperatures (greater than 100 degrees Celsius (212 degrees Fahrenheit)) and elevated pressures in containment during a design-basis accident. In calculating NPSH margin to demonstrate it is sufficient, new active PWR designs, similar to most operating PWRs, credit the inclusion of vapor pressure developed in containment during an accident in the NPSH margin calculation. (See Section 2.0 of Enclosure 1).

The regulation at 10 CFR 52.47, "Contents for applications; technical information," effectively requires design certification applicants to perform PRAs; an analogous regulatory requirement in 10 CFR 52.79 exists for combined license applicants. Therefore, the staff can request both design certification and combined license applicants to assess the risk significance of using CAP using the required PRA.

The staff will review the use of CAP in NPSH evaluations in the same manner for new reactors and operating plants, except for the treatment of risk.

CAP Regulatory Guidance

The staff's guidance on CAP appears in several NRC documents. Guidance to external stakeholders is provided in RG 1.1 and RG 1.82, Revision 3. CAP guidance to the NRC staff appears in NUREG-0800, "Standard Review Plan for the Review of Safety Analysis Reports for Nuclear Power Plants: LWR Edition" (SRP), Section 6.2.2, "Containment Heat Removal Systems," Revision 5, issued March 2007, and in the Office of Nuclear Reactor Regulation's document, RS-001, Revision 0, "Review Standard for Extended Power Uprates," dated December 24, 2003 (ADAMS Accession No. ML033640024). Based on the Commission's

decision on this issue and after further discussions with ACRS, the staff intends to revise both the regulatory guides and the SRP to ensure consistency. For example, RG 1.1 states that only the pressure before a postulated accident should be used, while RG 1.82 Revision 3 permits an exception for operating reactors for which plant modifications to avoid using CAP are impracticable. Also, SRP Section 6.2.2 provides acceptance criteria for containment spray pumps if CAP is credited in NPSH evaluations, but it does not mention the ECCS pumps. In addition, SRP Section 6.2.2 mentions performing an evaluation of the contribution to plant risk for CAP, which is not consistent with SRP Section 19.2, "Review of Risk Information Used to Support Permanent Plant-Specific Changes to the Licensing Basis: General Guidance," Appendix D, "Use of Risk Information in Review of Non-Risk-Informed License Amendment Requests," issued June 2007, and the Commission's SRM in SECY-99-246, "Proposed Guidelines for Applying Risk-Informed Decision Making in License Amendment Reviews," dated January 5, 2000, and which is not mentioned in other guidance documents. (See the Issue 2 discussion).

Backfitting Considerations

The regulation at 10 CFR 50.109 requires a backfit analysis of any proposed change or new requirement except in three cases: (1) the backfitting is necessary to bring a facility into compliance with a license or the rules or orders of the Commission, or into conformance with written commitments by the licensee, (2) backfitting is necessary to ensure that the facility provides adequate protection to the health and safety of the public and is in accord with the common defense and security, or (3) the backfitting involves defining or redefining what level of protection to the public health and safety or the common defense and security should be regarded as adequate. The CAP credit issue does not rise to the level of questioning adequate protection, and the use of CAP does not constitute noncompliance with applicable NRC requirements. Therefore, to impose a backfit on licensees currently using CAP, the NRC must demonstrate under § 50.109(a)(3) that: (1) imposition of new NRC requirements constitutes a substantial increase in the overall protection of the public health and safety or the common defense and security, and (2) the direct and indirect costs of implementing the regulatory action are justified in view of this increased protection.

Options to Address the CAP Issue

The staff has identified the following two options for addressing the CAP issue for operating reactor reviews. New reactor reviews will continue and deviations from guidance will be reviewed on a case by case basis.

(1) The staff resumes work on EPU applications. The staff's evaluation of current EPU applications, as well as future applications for new or increased credit for CAP, would be consistent with staff practice in implementing the current risk review guidance (SRP Section 19.2), including the review of nonrisk-informed applications such as EPUs (Appendix D of SRP Section 19.2) and the recently-developed deterministic guidance based on ACRS recommendations to include uncertainty and margins in CAP calculations. The staff would not further consider the issue of CAP credit, *per se*, as a generic safety matter. The staff will update the regulatory guidance to remove the specific guidance disfavoring the use of CAP in determining NPSH margin.

(2) The staff will resume work on EPU applications, and in parallel with these reviews, the staff will conduct a backfit/regulatory analysis of the use of CAP. Depending upon the results of the backfit/regulatory analysis, the staff may backfit plants currently approved to use CAP credit and plants with current EPU applications where the applications are approved before the completion of the backfit analysis. The staff will update the regulatory guidance to reflect the results of the backfit/regulatory analysis.

Option 1 maintains the "status quo" using the current staff review procedure (including SRP Section 19.2 and no practicability assessment), except that it would use the improved guidance that resulted from ACRS recommendations to include margin and uncertainty determinations in CAP calculations. If the Commission selects Option 1, then the staff's review of license amendment requests involving CAP would not consider the remaining ACRS concerns regarding CAP.

Option 2 includes a staff action to develop a backfit/regulatory analysis of alternatives to the use of CAP credit. The backfit/regulatory analysis would determine whether eliminating some or all CAP credit represents a significant safety improvement, the costs of which could be justified.

The cost justification would be conducted consistent with NUREG/BR-0058, Revision 4, "Regulatory Analysis Guidelines of the U.S. Nuclear Regulatory Commission," issued September 2004, which states that a regulatory analysis must include the following:

- the NRC's objectives for the proposed regulatory action,
- identification of and preliminary analysis of alternative approaches,
- an estimate and evaluation of the values and impacts for the selected alternatives,
- conclusion reached concerning values and impacts and a safety goal evaluation, where appropriate, and
- a decision rationale for selecting the proposed regulatory action.

The backfit/regulatory analysis would examine the value and impact of different options to resolve the CAP issue. These options would include use of CAP in determining NPSH margin and examining various plant modifications that would eliminate the need for CAP. Based on the results of the backfit/regulatory analysis, the staff would determine whether any options are justifiable from a cost/benefit standpoint using standard regulatory analysis principles, and (to the extent that an option would be imposed on plants currently approved for CAP) whether the option meets the backfit rule's cost-justified substantial increase criteria. The staff would follow the existing regulatory processes to implement the new guidance and requirements.

The staff also considered two other options that were rejected for the reasons given below:

(1) Any applications relying on CAP would be placed on hold pending the results of a backfit/regulatory analysis of the use of CAP credit. The staff rejected this option because 10 CFR 50.109(d) explicitly states that no licensing action will be withheld during the pendency of backfit/regulatory analyses.

(2) The NRC would modify current regulatory guidance by indicating that CAP credit will not be allowed for future extended power uprate (EPU) reviews. This option raises the question of why CAP can continue to be used by those plants that have increased their

power level and credited CAP. The staff rejected this option because the justification for not allowing future use of CAP credit (or an increase in the amount of CAP credit) in future EPUs would have to be justified using a regulatory analysis. Therefore, this option is subsumed by Option 2, above.

Using Option 2, the staff would continue, pending completion of the backfit/regulatory analysis, to review operating reactors and new reactors using the respective current guidance. This includes considering risk, as appropriate, consistent with SRM SECY 99-246 and SRP Section 19.2, Appendix D, for operating reactors, the application of the recently-developed deterministic staff guidance on uncertainty and pump cavitation phenomena related to NPSH margin.

RECOMMENDATION

The staff recommends Option 1 (no additional resources for fiscal years 2011, 2012, and 2013) under which the staff resumes work on EPU applications. The staff's evaluation of current EPU applications, as well as future applications for new or increased credit for CAP would be consistent with staff practice in implementing the current risk guidance on use of CAP (SRP Section 19.2) and the recently-developed deterministic guidance based on ACRS recommendations to include uncertainty and margins in CAP calculations. The staff would not consider the issue of CAP credit as a generic safety matter. This recommendation is consistent with past staff practice and is based on the following considerations as documented in Enclosure 1 to this paper.

- No regulation restricts the use of CAP. Existing regulations, staff guidance and plant technical specifications are intended to ensure that the containment is a low-leakage, robust structure, the integrity of which is demonstrated periodically (see Section 5.1 of Enclosure 1).

- ECCS and containment heat removal pumps are typically robust and have been shown to tolerate some levels of cavitation without sustaining damage (see Section 5.3 of Enclosure 1).

- The risk from allowing CAP credit for a BWR/3 with a Mark I containment with a leak detection interval of once per month is very small, based on a generic risk assessment (see Section 5.5 of Enclosure 1).

- Adequate protection of public health and safety is provided even when CAP credit is allowed.

RESOURCES:

The following staff full-time equivalent support resources are required to complete either Option 1 (the recommended option) or Option 2. The resources for Option 1 are included in the Fiscal Year (FY) 2011 Congressional Budget Justification and the FY 2012 Performance Budget request for the office of Office of Nuclear Reactor Regulation. There are no additional resources needed in the recommended option for fiscal years FY 2011, FY 2012, and FY 2013. If the Commission chooses Option 2, an additional 2.2 FTE would be required for FY 2012.

These additional funds for FY 2012 would be addressed during the FY 2013 Planning, Budgeting, and Performance Management Process (PBPM).

	Business Line	Product Line	Product	Planned Activity	Description	FY 2011		FY 2012	
						CS&T	FTE	CS&T	FTE
Option 1 (recommended)	Operating Reactors	Licensing	Licensing Actions	Other Licensing Tasks	Update Guidance Documents	0	0.6	0	1.1
Option 2	Operating Reactors	Licensing	Licensing Actions	Other Licensing Tasks	Update Guidance Documents and Perform Regulatory Analysis	0	1.0	0	3.3

COORDINATION:

The Office of the General Counsel has reviewed this paper and has no legal objection. The Office of the Chief Financial Officer has reviewed this paper for resource implications and concurred.

/RA by Martin J. Virgilio for/

R. W. Borchardt
Executive Director
for Operations

Enclosures:
1. Use of Containment Accident Pressure
2. Areas of Agreement and Disagreement

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Enclosures:
1. Use of Containment Accident Pressure
2. Areas of Agreement and Disagreement

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ADAMS Accession No.: Pkg ML102780586 SECY ML102590196 *concurred via email

OFFICE	NRR/DSS/SCVB	NRR/DRA	BC:NRR/DSS/SCVB	BC:NRR/DRA/APLA*	BC:NRR/DSS/SSIB	D:NRR/DSS
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DATE	01/26/11	12/27/10	12/20/10	01/03/11	01/06/11	12/29/10
OFFICE	D:OCFO/DPB*	OGC	NRR	EDO		
NAME	GPeterson	BJones	ELeeds (JGrobe for)	RBorchardt (MVirgilio for)		
DATE	01/31/11	01/26/11	01/28/11	1/31/11		

OFFICIAL RECORD COPY