January 13, 1999

FOR: The Commissioners

FROM: William D. Travers /s/
Executive Director for Operations

SUBJECT: RULEMAKING PLAN:REVISION OF APPENDIX K TO TITLE 10, PART 50, OF THE CODE OF FEDERAL REGULATIONS (10 CFR PART 50)

PURPOSE:

To inform the Commission of the staff's rulemaking plan regarding revision of a requirement in Appendix K, "ECCS Evaluation Models," to 10 CFR Part 50 to facilitate small, but cost-beneficial power uprates.

BACKGROUND:

In SECY-98-235 (October 9, 1998) the staff informed the Commission of its plans to relax a provision in Appendix K that requires emergency core cooling system (ECCS) performance analyses to assume the reactor to be operating at 1.02 times licensed power. The staff has prepared the attached rulemaking plan regarding the proposed revision of Appendix K for the Commission's consideration.

DISCUSSION:

As discussed in SECY-98-235, several licensees have informed the staff of their plans to seek credit in safety analyses for reducing uncertainties in measuring reactor power. The Commission was also informed of the request submitted by Texas Utilities Electric Company for an exemption to Appendix K on the basis of the use of the Caldon, Inc., flow measuring system at Comanche Peak Units 1 and 2. Additionally, ABB Combustion Engineering has expressed interest in the proposed rulemaking since its flow measuring system, which is similar to the Caldon device, is expected to be part of a licensee submittal in the near future.

Appendix K to 10 CFR Part 50 contains conservative requirements and recommendations for ECCS evaluation models. One conservative requirement is the 102-percent power assumption, which is part of the set of factors used to represent the sources of heat during the accident.

The opening sentence of Appendix K establishes the requirement to conduct ECCS analyses at a specified power level: "It shall be assumed that the reactor has been operating continuously at a power level at least 1.02 times the licensed power level (to allow for such uncertainties as instrumentation error)." As stated parenthetically in the rule itself, the requirement is imposed to account for uncertainties.

When the staff was considering changes to 10 CFR 50.46, "Acceptance Criteria for Emergency Core Cooling Systems for Light-Water Nuclear Power Reactors," to accept the use of best-estimate evaluations, it understood that Appendix K incorporated substantial conservative features (see SECY-83-472, "Emergency Core Cooling System Analysis Methods," November 17, 1983). These features were necessary when the rule was written because of a lack of experimental evidence. The major analysis inputs and assumptions that contribute to the conservatism in Appendix K are grouped together under Sections A through D of the rule: (A) Sources of Heat During the LOCA (includes the 102-percent power provision), (B) Swelling and Rupture of the Cladding and Fuel Rod Thermal Parameters, (C) Blowdown Phenomena, and (D) Post-blowdown Phenomena: Heat Removal by ECCS. In each of these areas, several assumptions are typically used to assure conservatism in the analysis results. For instance, under Sources of Heat During the LOCA, in addition to the 102-percent requirement, decay heat is modeled on the basis of an American Nuclear Society standard with an added 20-percent penalty, and the power distribution shape and peaking factors expected during the operating cycle are chosen to yield the most conservative results. As discussed in SECY-83-472, experimental programs provided ample data that shed light on the considerable margin provided by Appendix K, giving the staff confidence to consider alternative ECCS evaluation models.

The staff believes that a relaxation to the assumed power level provision of Appendix K is feasible. Licensees have proposed utilizing instrumentation that would reduce the uncertainties associated with measurement of reactor power, thus allowing justification of a reduced margin between the licensed power level and the power level assumed for ECCS evaluations. Under the preferred rulemaking option presented in the rulemaking plan, licensees would be given the option to apply a reduced margin between the licensed power level and the assumed power level for ECCS evaluation, or they could maintain the current margin of 2-percent power. If licensees can show that the uncertainties associated with power measurement instrumentation errors are less than 2 percent, and a smaller margin can be justified, then the current rule unnecessarily restricts operation. The staff does not plan to set a minimum acceptable powerlevel for analysis.

As presented in the rulemaking plan, a significant financial benefit to the industry could be realized by relaxing this requirement. The proposed change appears to involve a minimal risk impact, or possibly even a risk reduction in some cases, as indicated by the Comanche Peak example. The intent of the rule, to assure margin to ECCS performance in the event of a LOCA, would still be honored and plant risk would not be significantly affected following the preferred rulemaking option. To support the proposed revision of the regulation, the staff intends to use Regulatory Guide 1.174, "An Approach for Using Probabilistic Risk Assessment in Risk-Informed Decisions on Plant-Specific Changes to the Current Licensing Basis," and Standard Review Plan Chapter 19, "Use of Probabilistic Risk Assessment in Plant-Specific, Risk-Informed Decisionmaking: General Guidance."

RESOURCES:

Resources to conduct the rulemaking (approximately 1 FTE, primarily NRR, over one year) are currently budgeted. Resources to revise any regulatory

guidance (approximately 0.4 FTE total) would be made available from resources currently budgeted for this purpose. Resources to implement the rule, as described in the attached rulemaking plan, are dependent upon the option chosen and the number of plants requesting margin reduction and/or power uprate. These preliminary resource estimates will be refined and further addressed during development of the rule.

COORDINATION:

The Office of the General Counsel has no legal objections to the rulemaking plan. The Office of the Chief Financial Officer has reviewed this paper for resource implications and has no objections. The Office of the Chief Information Officer has reviewed the rulemaking plan for information technology and information management implications and concurs with the proposed rulemaking activity.

RECOMMENDATION:

That the Commission note that the staff plans to proceed with the attached rulemaking plan. Staff requests action within 10 days. Action will not be taken until the SRM is received. We consider this action to be within the delegated authority of the EDO.

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Attachment: Rulemaking Plan

Rulemaking Plan
Revision of Appendix K,
10 CFR Part 50

Regulatory Issue

Appendix K to 10 CFR Part 50, "ECCS Evaluation Models," contains a requirement that safety analyses used for evaluation of the performance of the emergency core cooling system (ECCS) under loss-of-coolant-accident (LOCA) conditions be conducted at 1.02 times the licensed power for the plant. The provision is intended to account for uncertainties in reactor power level, such as instrumentation error. Licensees have proposed utilizing instrumentation that would reduce the uncertainties associated with measurement of reactor power, thus allowing justification of a reduced margin between the licensed power level and the power level assumed for ECCS evaluations. If the uncertainties associated with power measurement instrumentation errors can be shown to be less than 2 percent, and a smaller margin can be justified, the current rule unnecessarily restricts operation. Therefore, the objective of this rulemaking is to allow the removal of an unnecessary regulatory requirement.

Existing Regulatory Framework

Appendix K to 10 CFR Part 50 was written to define conservative analysis assumptions for ECCS performance evaluations during design-basis LOCAs.

Large margins for important safety parameters (e.g., fuel cladding oxidation) were provided by conservatively selecting the ECCS performance criteria as well as conservatively establishing ECCS calculational requirements. One conservative calculational requirement is to assume that the reactor is operating at 102-percent power when the LOCA occurs. The opening sentence of Appendix K establishes the requirement to conduct ECCS analyses at a specified power level: "It shall be assumed that the reactor has been operating continuously at a power level at least 1.02 times the licensed power level (to allow for such uncertainties as instrumentation error)." As stated parenthetically in the rule itself, the requirement is imposed to account for uncertainties, including instrument error.

Section 50.46, "Acceptance Criteria for Emergency Core Cooling Systems for Light-Water Nuclear Power Reactors," requires that ECCS performance under LOCA conditions be evaluated and that the estimated performance satisfy certain criteria. Licensees may conduct an analysis that "realistically describes the behavior of the reactor system during a LOCA" (often termed a "best-estimate analysis"), or they may develop a model that conforms with the required and acceptable features of Appendix K.

When considering changes to 10 CFR 50.46 to accept the use of best-estimate evaluations, the staff understood that Appendix K incorporated substantial conservatisms and it considered methods that would acceptably reduce safety margins. In SECY-83-472, "Emergency Core Cooling System Analysis Methods," November 17, 1983, the staff discussed the sources of conservatism in ECCS evaluations and concluded that the safety margin provided by Appendix K assumptions could be reduced without an adverse impact on safety. These conservatisms were necessary when the rule was written because of a lack of experimental evidence regarding plant response to a LOCA. In SECY-83-472, the staff explained that experimental evidence and analysis advances allowed the consideration of alternative approaches, termed "best estimate" modeling, to treat the acceptable, but not required, features of Appendix K. In this rulemaking, the staff considers a change to a required feature of Appendix K, the 102-percent power assumption.

A preliminary review of other regulations and associated guidance showed that the 102-percent requirement does not appear elsewhere in the regulations but has been widely applied in guidance documents. The tables below list chapters of the Standard Review Plan (SRPs) which contain the 102-percent power requirement. The first table shows SRPs which incorporate the 102-percent value, but offer the possibility that a smaller value could be justified. The second table shows those SRPs which give the 102-percent value without an alternative.

The only regulatory guide containing the 102-percent power requirement is Regulatory Guide 1.49, "Power Levels of Nuclear Power Plants."

SRPs Containing the 102-percent Power Margin with an Option

SRP Chapter Number	Title
15.2.6	Loss of Non-emergency AC Power to the Station Auxiliaries
15.2.7	Loss of Normal Feedwater Flow
15.3.1 - 15.3.2	Loss of Forced Reactor Coolant Flow Including Trip of Pump and Flow Controller Malfunctions
15.3.3 - 15.3.4	Reactor Coolant Pump Rotor Seizure and Reactor Coolant Pump Shaft Break
15.4.3	Control Rod Misoperation (System Malfunction or Operator Error)
15.5.1 - 15.5.2	Inadvertent Operation of ECCS and Chemical and Volume Control System Malfunction That Increases Reactor Coolant Inventory
15.6.1	Inadvertent Opening of a PWR Pressurizer Relief Valve or a BWR Relief Valve
15.6.5	Loss-of-Coolant Accidents Resulting from Spectrum of Postulated Piping Breaks Within the Reactor Coolant Pressure Boundary

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SRPs Specifying the 102-percent Power Requirement

SRP Chapter Number	Title
6.2.1.3	Mass and Energy Release Analysis for Postulated Loss-of-Coolant Accidents
6.2.1.4	Mass and Energy Release Analysis for Postulated Secondary System Pipe Ruptures
15.1.1 - 15.1.4	Decrease in Feedwater Temperature, Increase in Feedwater Flow, Increase in Steam Flow, and Inadvertent Opening of a Steam Generator Relief or Safety Valve
15.2.1 - 15.2.5	Loss of External Load, Turbine Trip, Loss of Condenser Vacuum, Closure of Main Steam Isolation Valve (BWR), and Steam Pressure Regulatory Failure (Closed)

How the Regulatory Problem Will Be Addressed by Rulemaking

Revision of the rule will allow licensees to avert an unnecessary regulatory requirement by giving licensees the option of reducing the margin between the licensed power level and the assumed power level for ECCS evaluation. The staff's initial expectation, as described in the Options Section, is that the change to Appendix K would permit licensees to maintain their current 2-percent margin, but the revised rule would accept a different value if the uncertainties involved with power measurement can be demonstrated to be less than 2 percent of licensed power, and a smaller margin can be justified. The staff does not plan to set a minimum acceptable power level for analysis. Instead, the preferred rulemaking option requires licensees to justify any proposed reduction in the margin accounting for uncertainty in power measurement at their plant. During the rulemaking process, the staff intends to ensure that no other regulations rely on the 2-percent margin and to consider actions to revise guidance documents that include the requirement. There may be other less obvious connections with other ECCS evaluation model specifications, or other safety analysis issues. If necessary, these issues will be investigated by the staff before the rule is revised.

In the course of the rulemaking, the staff may need to assess the risk impact of the proposed change to Appendix K by applying appropriate guidance from Regulatory Guide 1.174, "An Approach for Using Probabilistic Risk Assessment in Risk-Informed Decisions on Plant-Specific Changes to the Current Licensing Basis," and SRP Chapter 19, "Use of Probabilistic Risk Assessment in Plant-Specific Risk-Informed Decisionmaking: General Guidance."

Rulemaking Options

The staff considered the following four rulemaking options:

(a) Maintain the provision requiring an analysis margin to account for uncertainty in power measurement but remove the specification of the 2-percent value for the margin. Licensees would then need to propose and justify the value used for their analysis.

This option is not preferred since it would not meet backfit criteria. Although it could provide relief to licensees that seek to reduce the margin, it would constitute a backfit on those licensees that would not wish a change from the current required value but would nonetheless be required to justify a value. Since the proposed change is expected to have little risk impact, there is no basis for a compliance or adequate protection backfit for this option.

(b) Allow licensees the option to justify a smaller margin between licensed power and the assumed power level for ECCS analysis for their plant or to maintain the current margin now mandated.

This is the preferred option. Making this change to the rule would give licensees the opportunity to benefit from a reduced margin if they determine that there is value in providing the justification and implementing the modifications to support operation at a higher power level. Maintaining the current situation is not adverse to safety and should be permitted as an option.

(c) Eliminate the requirement for a margin between power level and assumed power.

This option is not preferred. The staff would investigate the feasibility of eliminating the requirement for an assumed power margin for analysis. If the requirement could be eliminated, licensees could seek a power uprate to the power level assumed in their LOCA analyses if their plants are currently LOCA-limited. Justification for this option would involve demonstrating the acceptability of not accounting for any uncertainties behind the 2-percent power analysis margin. The technical effort involved in this option is probably not justifiable since a generic demonstration of the safety implications would be more costly than for option (b), and there is no safety benefit relative to option (b).

(d) Broad revision of Appendix K addressing several conservative requirements.

The staff considered addressing several of the calculational requirements in Appendix K with the objective of reducing excessive conservatism. This would be a long-term effort, which, if pursued, would not avoid the exemption requests expected in the shorter term. Further, given the option in 10 CFR 50.46 for licensees to apply best-estimate methodology to avoid Appendix K conservatism, and the substantial staff resource effort entailed in a broad rule revision, the staff decided that this was not a preferred option.

Alternatives

Rather than instituting a rule change, multiple exemptions to the existing regulation could be granted under 10 CFR 50.12. A benefit to this approach would be that the NRC would avoid the costs of changing the rule and of implementing the revision. However, this is not a satisfactory alternative from regulatory efficiency and regulatory stability perspectives.

Each exemption request would need to be reviewed against the criteria of 10 CFR 50.12 in addition to its technical merits. A revision of the rule would provide greater regulatory stability than would a series of exemption requests. For instance, a single review of the generic risk implications for a rule revision would help avoid the potential of shifting regulatory thresholds which could occur over the course of consideration of separate exemption requests.

The exemption request review would be handled as a separate regulatory step from the review of a power uprate request for each application, as is the case with the pending exemption request for Comanche Peak Units 1 and 2. Applying this process to a series of exemption requests would be an

unnecessary use of NRC and licensee resources not encountered under a rule revision.

The staff has previously sought rule changes to avoid the prospect of multiple exemption requests. In SECY-96-147, "Planning for Pursuing Regulatory Improvement in the Area of Exemptions Granted to Regulations," the staff took steps to revise regulations that were associated with large numbers of recurring exemption requests. In the cases addressed in SECY-96-147, the rules were being changed as a result of recurrent exemptions, which indicated an inadequacy in a regulation. In the case of Appendix K, the staff is anticipating recurrent exemptions and has determined that revising the rule at this early stage will be the most beneficial course.

Under the preferred rulemaking option (b), as would be the case for exemptions to the existing requirement, licensees pursuing the benefit of a power uprate would be expected to prepare and submit requests to change their licensing basis for NRC review. However, the staff expects that submittals subject to the revised rule would be less involved than would those for individual exemption requests. This should be expected since licensees seeking a reduced margin between licensed power and the assumed power level for ECCS analysis will not be required to satisfy the criteria of 10 CFR 50.12, and a generic framework for the risk impact of the reduced margin should be determined during rulemaking. Licensee submittals seeking the reduced margin can show that the risk impact from the proposed change for their plant is consistent with the conclusions in the staff analysis to be conducted for the rulemaking, accounting for any plant-specific factors.

Impact on Licensees

For the first two rulemaking options considered, licensees would be faced with the burden of providing the technical justification for the power margin assumption applied to their plants. Under the third option, the NRC would need to justify a new value to replace that currently specified in the rule. The safety impact for each of the first three options should be the same since licensees could take steps resulting in an up to 2-percent increase in plant power. The fourth option, involving a much more complicated rule revision, would have cost, schedule, and safety impacts much different from the preceding options. Therefore, the largest distinction among the options is the cost and effort involved in implementation.

COST CONSIDERATIONS

For this rulemaking plan, the staff made rough cost estimates for scoping purposes only. A thorough value-impact analysis has not been performed for this evaluation but will be conducted in the course of the rulemaking process. The staff drew upon a regulatory analysis recently used in a rulemaking proposal, as well as NRC publications and other sources as the basis for the information used in these estimates. The operating reactor population used for this assessment was 103 plants as of December 1998. An assumption common to each option considered is that those licensees wanting to pursue power uprate afforded by a rule revision would do so over a 2-year period following issuance of the final rule.

Option (a): Under this option, licensees would be required to justify the power margin assumption for their facility, even if it is to remain unchanged. Licensees would need to quantify the uncertainties associated with instrumentation performance, which are accounted for by the 2-percent power margin. The reduction of power measurement uncertainties through a proposed refinement or replacement of plant systems would also need to be demonstrated by licensees. The intent of the rule, to assure margin to ECCS performance in the event of a LOCA, must still be honored and plant risk must not be significantly affected. Some licensees would seek the benefit of a smaller margin and request a power uprate. They would incur the costs of plant modifications and analyses needed to support operation at a higher power level along with the costs of conducting the analyses in support of the smaller power level margin. Other licensees would choose not to alter the power level and would bear only the cost of the analyses justifying the power level assumption, but without any benefit. For this evaluation, the staff assumed an approximately even split of the nuclear plant population between these two categories of 50 plant licensees seeking a power uprate, leaving 53 plant licensees not able or willing to seek the benefit.

Approximate values for both licensee and NRC costs are available from NUREG/CR-4627, "Generic Cost Estimates," which presents a cost estimate for a "complicated" technical specification change. For this assessment, the staff assumed that the analysis and submittal to justify a smaller assumed power margin incur about the same costs equivalent to such a "complicated" amendment, as would the analysis and amendment for the power uprate itself. Making adjustments for the period since publication of the NUREG in 1988, the licensee cost to justify a smaller assumed power margin is estimated to be $70,000. Licensees applying for a power uprate would incur an additional $70,000 analysis cost. Thus, each licensee would expend at least $70,000 under this option, and the analysis and submittal cost for those licensees seeking the power uprate would total approximately $140,000. In addition, the cost of plant modifications to accommodate a small power uprate is estimated to be in the range of $5 to $10 million, which accounts for hardware, procedural changes, and personnel training costs. This estimate is based on licensee power uprate cost estimates ranging from $150/KWe to $2250/KWe.[(1)]

The NRC impact would be significant, since all licensees would need to address the rule change under this option. NRC costs are based on dollar values, rather than staff full-time-equivalent positions (FTE), given in NUREG/BR-0184, "Regulatory Analysis Technical Evaluation Handbook," for the expected NRC staff effort to implement new requirements and on a so-called complicated technical specification amendment review discussed earlier. NUREG/CR-4627 estimates that such a review would entail an NRC cost of $42,000, adjusted to present value. Assuming that the NRC cost to review the proposed assumed power margin reduction is comparable to that required for a power uprate amendment, the cost for each would be in the range of $42,000. Thus, the NRC would incur a cost of $42,000 for each proposed margin reduction, and an additional $42,000 to process each request for a power uprate.

Cost savings might be realized if generic submittals were made to address those facilities of similar design, however, the staff would need to ensure that plant-specific features for certain facilities did not invalidate the generic assessment. Thus, some review would still be needed for each facility.

The rulemaking effort is estimated to require 0.9 FTE. Once the current regulation is changed, any NRC SRPs and regulatory guides that use the current required value for assumed power margin would need to be revised to remain consistent with the regulations. Revision of these guidance documents would add to the NRC impact and is estimated to be a one-time cost of about 0.4 FTE. The NRC total cost is estimated to be $162,000.

Option (b): Under Option (b), which is the preferred option, licensees would conduct an analysis to justify a reduced assumed power margin, but since

under this option the change is not mandatory, each licensee would first determine whether an investment in the analysis to reduce the value is justified in light of the potential benefit from power uprate.

As stated under Option (a), licensees electing to request a smaller margin for their analysis assumption along with a power uprate would incur analysis costs of about $140,000 to prepare their requests for NRC review, and implementation costs of about $5 to $10 million, for a total cost of $5.1 to $10.1 million. Other plants not electing to reduce their margin assumption would not be affected.

NRC costs to review the submittals, revise the rule, and to update review guidance are the same as those given for Option (a).

Option (c): Under this option, as in Option (b), only those licensees seeking a higher licensed power level would incur costs. The costs would be associated with changing their technical specifications and conducting those analyses necessary to change their licensing basis to operate at a higher power level. These costs are the same as those considered in Option (b).

Under this option, the NRC assumes a much greater burden in that the rulemaking to eliminate a requirement, versus its modification, would be expected to entail a significant amount of technical and administrative effort compared to the other options. For instance, the NRC staff would probably enlist contractor services to help develop its risk assessment of the revised rule, and a protracted review of the technical basis for the revision would be expected and would entail staff costs. NRC costs are estimated on the basis of the previous value for the staff review of a licensing basis revision, or about $84,000 for each licensee submittal, and a one-time NRC cost of $1.5 million assumed for the staff analysis of the generic issues involved and rulemaking to eliminate the requirement. This cost would be divided between staff effort and contractor services, as appropriate.

Option (d): Under this option, the staff would revise several parts of Appendix K, and some plants could then decide to seek higher licensed power levels under the revision. Since a more far-reaching rule change would reduce conservatisms by more than just a change to the power measurement conservatism, a greater potential benefit should be expected. Thus, for this option, the staff assumed that plants might realize a 5-percent power uprate if a broad revision of Appendix K was conducted. Therefore, the licensee cost to implement a power uprate for a facility would be about five times that assumed for the 1-percent change, or up to about $50 million. The licensee analysis costs and NRC rulemaking and review costs for this option are more difficult to estimate, but an increase by about a factor of 10 for this great a change is reasonable. Thus, the licensee reanalysis cost would be about $1.4 million per plant and the NRC cost to review each more extensive amendment would be about $1 million. The NRC would also incur one-time costs possibly as high as $10 million for the generic effort involved (i.e., rulemaking). This option would take much longer to implement than the others.

The cost estimates for the four options are summarized in the following table. (Note that the high estimate for licensee costs for power uprate is used in the table and that the NRC costs are comprised of salaries, benefits, and contract support.)

Cost Estimates for Rulemaking Options (1998 dollars)

Option[1]	No. of Plants	Licensee Costs (per plant)			Licensee Total (each option)	NRC Costs			NRC Total (each option)	OVERALL TOTAL
						(per plant)		Generic		
		AnalyzeMargin Change	Analyze Power Uprate	Effect Power Uprate		Process Margin Change	Process Power Uprate	Rule & Guide Changes		
a[2]	53	$70K			$511M	$42K		$162K	$6.5M	$518M
	50	$70K	$70K	$10M		$42K	$42K			
b	50	$70K	$70K	$10M	$507M	$42K	$42K	$162K	$4.3M	$511M
c	50	$70K	$70K	$10M	$507M	$42K	$42K	$1.5M	$5.7M	$513M
d	50	$700K	$700K	$50M	$2.6B	$500K	$500K	$10M	$60M	$2.6B
Notes	1. Options (a) - (c) consider a 1-percent power uprate, while option (d) involves a 5-percent power uprate. 2. For Option (a), 50 plants request a 1-percent power uprate, while 53 plants do not pursue power uprate.									

RISK CONSIDERATIONS

Under the rulemaking options considered herein, a likely outcome of a proposed change to the power margin assumed for ECCS analysis is a power level increase, which could affect plant risk in several ways. The increased heat source could have an effect on anticipated transients without scram (ATWS) progression, containment analyses, ECCS analyses, and other accidents.

A principal effect of increased power would be an increase in fission product inventory. Increased power levels will primarily increase the inventory of short-lived isotopes. To a first approximation, the inventory increase will be proportional to the increase in power level; therefore, a 1-percent power increase would result in no more than a 1-percent increase in fission products. Although fission product inventories can be predicted reasonably accurately, analysis of fission product transport from the fuel to the environment involves uncertainties that are considered large with respect to the change in source term anticipated from a small power level increase.

Progression and consequences of certain events may change as a result of operation at higher power (e.g., increased frequency of power-operated relief

valve failure during station blackout), thereby affecting the core damage frequency and major release characteristics. A higher power level will result in a higher decay heat load and may affect the success criteria and required response time of ECCS and the available operator response time following transients and accidents. NUREG-1230, "Compendium of ECCS Research for Realistic LOCA Analysis," considered the risk impact of changes associated with the revised ECCS rules, including power increase, and determined that a power change of 5 percent or less had little risk significance.

Operation at higher power could lead to greater energy release to containment during a severe accident. Also, changes in core parameters will influence the in-vessel accident progression, which also affects containment loadings. However, licensees should examine these effects on a plant-specific basis since a number of factors, in addition to power level, influence containment loading analysis, and licensees should assess the effect of a small power increase in the context of the safety margin available at a particular plant.

Benefits

The proposed rulemaking would provide the benefit of removing an unnecessary regulatory requirement for those licensees who wish to use the option. There may be safety and other non-quantifiable benefits to the revision. In the Appendix K exemption request the staff is currently reviewing the instrumentation manufacturer (Caldon, Inc.) claims that a safety benefit will be achieved by using the instrument even during operation at a higher power level. Although the staff is still reviewing information, the vendor has attempted to quantify the benefit in terms of the probability that the power level of the plant will be above the licensed level at the initiation of the accident. There are also non-quantifiable benefits, such as improved regulatory efficiency, since multiple exemption requests need not be considered.

In addition to realizable safety benefits, an economic benefit is a strong consideration. The economic benefit of an increase in licensed power can be considered in terms of replacement energy cost savings for utilities that no longer need to purchase the additional power generated as a result of a power uprate. For this evaluation, the benefit is considered on an industry-wide basis. The retail price of electricity sold by electric utilities during 1997 and the first 7 months of 1998 was an average of 6.83 cents per kilowatt-hour.(2) Using the value of electricity produced by nuclear generation in 1997, 631 billion KWH (reflects an industry-wide capacity factor of 70 percent), and assuming a typical power increase of 1 percent to be achievable from the change in assumed power margin, the maximum annual increase in electrical output would be about 6.3 billion KWH.(3) Using these values, utilities could gain a maximum of about $430 million annually, or about $4.1 million per plant. If only 50 plant licensees pursue power uprate, as assumed earlier, they would share an annual benefit of about $205 million, which is still a substantial industry benefit.

After 1 to 3 years of operation at an increased power level, the recurring benefit from a 1-percent power uprate compares favorably with the licensee cost of pursuing the power uprate estimated in this evaluation for each rulemaking option considered. As stated earlier, a more thorough value-impact analysis will be conducted during the rulemaking, which will include the full extent of attributes to be considered. Of course, plant-specific features and situations change the assessment for any given plant either more or less favorably than the estimate portrayed here. Factors influencing the decision of a utility to upgrade a plant vary, and a plant-specific cost-benefit analysis would be required to determine whether a specific facility should pursue the uprate.

Legal Analysis by the Office of the General Counsel

The proposed rule would provide a voluntary alternative to licensees who wish to decrease the margin between licensed power and assumed power level for ECCS analyses under 10 CFR Part 50, Appendix K. The proposed rule should be written to preserve the existing licensing basis for licensees who do not wish to take advantage of the voluntary alternative provided in this rulemaking. Another issue that would need to be resolved is whether the rule will require licensees to obtain NRC review and approval of the methodology and bases supporting a reduction in margin as permitted by the rule before the licensee implements the reduction in margin. Finally, the rule and/or the statement of considerations should make clear the applicable documentation requirements and change standards applicable to the alternative models.

The purpose of this rulemaking should be described as a reduction in unnecessary margin in performing ECCS analyses, and the regulatory analysis for this rule making would be limited to a determination of what is the most effective way of achieving the NRC goal of eliminating an unnecessary safety requirement while still maintaining an acceptable level of safety.

The proposed rule will require preparation of an environmental assessment (EA), as it appears that there are no categorical exclusions in 10 CFR 50.51(c) which would apply to this rulemaking.

We do not believe that the proposed rule will constitute a backfit as defined in Section 50.109(a)(1). This is because the rule would provide a voluntary alternative to licensees who wish to decrease the margin between licensed power and assumed power level for ECCS analyses. Licensees who choose not to decrease the margin can continue to operate with their existing ECCS analyses under 10 CFR Part 50, Appendix K.

It is unclear whether the rule is a "major rule" under the Small Business Regulatory Enforcement Fairness Act, inasmuch as there is insufficient information provided as to whether the rule is likely to result in a $100 million impact upon nuclear power plant licensees. If the rule is not a major rule, then the mandated 60 day period prior to effectiveness of major rules is not applicable.

The proposed rule will require licensees to generate and maintain records related to the determination to reduce the margins between licensed power and assumed power level for ECCS analyses. Accordingly, the change will require OMB review for purposes of the Paperwork Reduction Act.

In accordance with the National Technology Transfer and Advancement Act of 1995, P.L. 104-1 13, the Staff should determine whether there are any consensus codes and standards that exist with respect to power calculations for ECCS that could be adopted as an alternative to the proposed modifications to 10 CFR Part 50, Appendix K.

Category of Rule

The category of this rule is burden relief.

Based upon the preliminary economic impact assessment conducted for this rulemaking plan, this appears to be a major rule as defined under the Small Business Regulatory Enforcement Fairness Act because it is likely to result in an economic impact over $100 million. As discussed in the Benefits section of this rulemaking plan, the overall economic benefit for industry appears to range from about $200 million to as much as $400 million. A final determination of whether this is a major rule will be made once a detailed regulatory analysis is conducted.

Backfit Analysis

Since the proposed revision to Appendix K provides licensees with an alternative for evaluating ECCS performance, it is a voluntary alternative which does not meet the definition of a backfit as defined in 10 CFR 50.109(a)(1). Accordingly, the staff does not intend to prepare a backfit analysis for this rulemaking.

Supporting Documents Needed

Although existing guidance on risk-informed regulation should be used when licensing basis changes are proposed, a separate regulatory guide may be needed to help licensees consider the implications of reducing the margin between licensed power and the assumed power for ECCS analysis at their plant.

An environmental assessment will be conducted and the applicable coordination procedures in NUREG/BR-0053, "Regulations Handbook," will be followed.

A Paperwork Reduction Act statement, requiring Office of Management and Budget (OMB) clearance, will be needed since a large number of licensees may volunteer to seek the reduced power margin benefit. The OMB clearance package will be submitted with the proposed rule.

The change will require revisions to some SRPs and regulatory guides.

Issuance by Executive Director for Operations or the Commission

This rule is to be issued by the Commission.

Interoffice Management Steering Group

An interoffice steering group is not required for this rulemaking.

Public / Industry Participation

The staff will seek public comment by way of a proposed rule.

The staff has no plans for "enhanced" participation (i.e., workshops or webpage) since this participation would involve more resources and would extend the schedule unnecessarily.

Resources

NRR Staff Lead	Joseph Donoghue
NRR Supporting Division Staff	DSSA/SRXB, SPSB DRPM/PEB
Regional Contacts	N/A
OGC Staff Contact	Geary Mizuno
Anticipated Effort for Rulemaking	0.9 FTE
Program Funds Required	None anticipated

Upon the Commission's approval of this rulemaking plan, the staff will update the next edition of the Rulemaking Activity Plan.

Schedule

Proposed rule to EDO	6 months following approval of rulemaking plan
Public comment period on the proposed rule	75 days
Final rule to the EDO	5 months following publication of the proposed rule

1. Letter from E.P. Rahe, Westinghouse, to Dr. D.F. Ross, NRC, "LOCA Margin Benefits," February 8, 1985. The cost values quoted are in 1985 dollars.

2. Department of Energy, Energy Information Agency Website, Table 9.9 (www.eia.doe.gov/price.html EXIT NEI).

3. Nuclear Energy Institute Website, U.S. Nuclear Power Plant Performance Page (http://www.nei.org/doc.asp?catnum=3&catid=624 EXIT).