

Request for OMB Review

PDR

ORIGINAL
P. Smith

Important

Read instructions before completing this form. Do not use the same SF 83 to request both an Executive Order 12291 review and approval under the Paperwork Reduction Act.

Answer all questions in Part I. If this request is for review under E.O. 12291, complete Part II and sign the regulatory certification. If this request is for approval under the Paperwork Reduction Act and 5 CFR 1320, skip Part II, complete Part III and sign the paperwork certification.

Send three copies of this form, the material to be reviewed, and for paperwork—three copies of the supporting statement, to:

Office of Information and Regulatory Affairs
Office of Management and Budget
Attention: Docket Library, Room 3201
Washington, DC 20503

PART I.—Complete This Part for All Requests.

1. Department/agency and Bureau/office originating request U.S. Nuclear Regulatory Commission		2. Agency code 3 1 5 0
3. Name of person who can best answer questions regarding this request Roberta Ingram		Telephone number (301) 504-1219
4. Title of information collection or rulemaking 10 CFR 50, Domestic Licensing of Production and Utilization Facilities		
5. Legal authority for information collection or rule (cite United States Code, Public Law, or Executive Order) 42 USC 2201(o) or		
6. Affected public (check all that apply)		5 <input type="checkbox"/> Federal agencies or employees
1 <input type="checkbox"/> Individuals or households	3 <input type="checkbox"/> Farms	6 <input type="checkbox"/> Non-profit institutions
2 <input type="checkbox"/> State or local governments	4 <input checked="" type="checkbox"/> Businesses or other for-profit	7 <input type="checkbox"/> Small businesses or organizations

PART II.—Complete This Part Only if the Request is for OMB Review Under Executive Order 12291

7. Regulation Identifier Number (RIN) _____, or, None assigned

8. Type of submission (check one in each category)		Type of review requested	
Classification	Stage of development	1 <input type="checkbox"/> Standard	2 <input type="checkbox"/> Pending
1 <input type="checkbox"/> Major	1 <input type="checkbox"/> Proposed or draft	3 <input type="checkbox"/> Emergency	4 <input type="checkbox"/> Statutory or judicial deadline
2 <input type="checkbox"/> Nonmajor	2 <input type="checkbox"/> Final or interim final, with prior proposal		
	3 <input type="checkbox"/> Final or interim final, without prior proposal		

9. CFR section affected _____ CFR _____

10. Does this regulation contain reporting or recordkeeping requirements that require OMB approval under the Paperwork Reduction Act and 5 CFR 1320? Yes No

11. If a major rule, is there a regulatory impact analysis attached? Yes No
If "No," did OMB waive the analysis? Yes No

Certification for Regulatory Submissions

In submitting this request for OMB review, the authorized regulatory contact and the program official certify that the requirements of E.O. 12291 and any applicable policy directives have been complied with.

Signature of program official	Date
Signature of authorized regulatory contact	Date

12. (OMB use only)

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SUPPORTING STATEMENT FOR PROPOSED RULE,
"10 CFR PART 50.67: SHUTDOWN AND LOW-POWER OPERATIONS"

Revision to Existing Requirement

(OMB Clearance No. 3150-0011)

DESCRIPTION OF THE INFORMATION COLLECTION

Proposed 10 CFR 50.67 of NRC's regulations, "Shutdown and Low-Power Operations for Nuclear Power Reactors," would require power reactor licensees to implement safety improvements to resolve NRC concerns regarding shutdown and low-power operations. In part, licensees would be required to (1) establish controls in technical specifications limiting conditions for operation and surveillance requirements in accordance with the requirements of 10 CFR 50.36(c)(2) and (3), or plant procedures required by technical specifications administrative controls pursuant to 10 CFR 50.36(c)(5) for equipment which licensees identify as necessary to perform their safety function when plants are in a shutdown or low power condition; and (2) evaluate realistically the effects of fires stemming from activities conducted during cold shutdown or refueling conditions, determine whether such fires could prevent accomplishment of the normal decay heat removal capability, and if so, either provide measures to prevent loss of normal decay heat removal or establish a contingency plan that will ensure an alternate decay heat removal capability exists. These reporting and recordkeeping requirements, in addition to other actions required by the proposed amendment to NRC's regulations, are intended to protect public health and safety from the risk of a core-melt accident.

A. JUSTIFICATION

1. Need for the Collection of Information

This information is needed to resolve NRC concerns regarding shutdown and low-power operations at commercial nuclear power plants. A comprehensive evaluation of shutdown and low-power issues is documented in NUREG-1449, "Shutdown and Low-Power Operations at Nuclear Power Plants in the United States," issued September 1993. While the results of NRC's evaluation have confirmed that public health and safety have been adequately protected during the period that plants have been in shutdown and low-power conditions, substantial safety improvements are possible and NRC requirements are warranted.

Specifically, the proposed rule contains the following reporting and recordkeeping requirements:

Section 50.67(c)(3)(i) requires licensees to identify that equipment (including electric power and compressed air) necessary to (a) make the reactor subcritical or critical in a controlled manner and maintain it subcritical in a shutdown condition, (b) maintain reactor coolant system inventory and capability to add makeup water to the reactor vessel, (c) remove decay heat from the reactor, (d) monitor water level in the reactor vessel, and (e) maintain or

reestablish containment integrity when the plant is in a shutdown or low power condition.

Section 50.67(c)(3)(ii) requires licensees to establish controls for the equipment identified in 50.67(c)(3)(i) such that they will perform their safety function when the plant is in a shutdown or low power condition. The controls must reflect sufficient redundancy in systems, subsystems, components, and features to ensure that, for the onsite electric power system in operation (assuming offsite power is not available), safety functions can be accomplished, assuming a single failure, for all conditions except refueling operations (with water level above the reactor in excess of a lower limit established in applicable technical specifications or plant procedures).

Section 50.67(c)(3)(iii) requires that the controls required by 50.67(c)(3)(ii) be included in either:

(A) technical specifications limiting conditions for operation and surveillance requirements in accordance with the requirements of 10 CFR 50.36(c)(2) (Limiting Conditions for Operations) and (3) (Surveillance Requirements).

(B) plant procedures required by technical specifications administrative controls pursuant to 10 CFR 50.36(c)(5).

Section 50.67(c)(4) requires licensees, prior to (and throughout the shutdown refueling outage as necessary to accommodate unforeseen contingencies) entering cold shutdown or a refueling condition, to evaluate realistically available fire protection features and the outage plan for possible fires stemming from activities conducted during cold shutdown or refueling conditions, and determine realistically whether such fires could prevent accomplishment of normal decay heat removal capability during cold shutdown or refueling conditions. If the evaluation shows that such fires would prevent accomplishment of normal decay heat removal capability, the licensee must accomplish either of two actions. One such action, specified in Section 50.67(c)(4)(ii), requires licensees to have a contingency plan in place that will ensure an alternate decay heat removal capability exists and that will describe the general steps to connect the alternate decay heat removal system to the Reactor Coolant System.

All of the above requirements, except 50.67(c)(3)(iii)(A), are considered recordkeeping requirements. Controls included in plant technical specifications (50.67(c)(3)(iii)(A)) would be submitted by licensees on a one-time basis for NRC review and approval prior to implementation. Once approved, these technical specifications, as well as controls included in plant procedures, evaluations of fire protection features, and any contingency plan as may be required by 50.67 would be maintained until termination of the plant's license.

reestablish containment integrity when the plant is in a shutdown or low power condition.

Section 50.67(c)(3)(ii) requires licensees to establish controls for the equipment identified in 50.67(c)(3)(i) such that they will perform their safety function when the plant is in a shutdown or low power condition. The controls must reflect sufficient redundancy in systems, subsystems, components, and features to ensure that, for the onsite electric power system in operation (assuming offsite power is not available), safety functions can be accomplished, assuming a single failure, for all conditions except refueling operations (with water level above the reactor in excess of a lower limit established in applicable technical specifications or plant procedures).

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(A) technical specifications limiting conditions for operation and surveillance requirements in accordance with the requirements of 10 CFR 50.36(c)(2) (Limiting Conditions for Operations) and (3) (Surveillance Requirements).

(B) plant procedures required by technical specifications administrative controls pursuant to 10 CFR 50.36(c)(5).

Section 50.67(c)(4) requires licensees, prior to (and throughout the shutdown refueling outage as necessary to accommodate unforeseen contingencies) entering cold shutdown or a refueling condition, to evaluate realistically available fire protection features and the outage plan for possible fires stemming from activities conducted during cold shutdown or refueling conditions, and determine realistically whether such fires could prevent accomplishment of normal decay heat removal capability during cold shutdown or refueling conditions. If the evaluation shows that such fires would prevent accomplishment of normal decay heat removal capability, the licensee must accomplish either of two actions. One such action, specified in Section 50.67(c)(4)(ii), requires licensees to have a contingency plan in place that will ensure an alternate decay heat removal capability exists and that will describe the general steps to connect the alternate decay heat removal system to the Reactor Coolant System.

All of the above requirements, except 50.67(c)(3)(iii)(A), are considered recordkeeping requirements. Controls included in plant technical specifications (50.67(c)(3)(iii)(A)) would be submitted by licensees on a one-time basis for NRC review and approval prior to implementation. Once approved, these technical specifications, as well as controls included in plant procedures, evaluations of fire protection features, and any contingency plan as may be required by 50.67 would be maintained until termination of the plant's license.

2. Agency Use of Information

The required information either will be: (1) submitted by licensees for NRC review and approval prior to implementation, as in the case of controls that are included in plant technical specifications; or (2) subject to NRC audit and inspection, as in the cases of controls that are included in plant procedures, evaluations of fire protection features, and any contingency plan as may be required by 50.67.

3. Reduction of Burden Through Information Technology

There are no legal obstacles to reducing the burden associated with this information collection. Licensees are encouraged to use modern information technologies to collect, analyze, and store the information required under the provisions of 10 CFR Part 50.

4. Duplication With Other Collections of Information

The Information Requirements Control Automated System (IRCAS) was searched, and no duplication was found.

5. Effort to Use Similar Information

There is no similar information available to the NRC.

6. Effort to Reduce Small Business Burden

The information collection affects only licensees of nuclear power plants. These licensees do not fall within the scope of the definition of "small entities" as given in the Regulatory Flexibility Act or the Small Business Size Standards in regulations issued by the Small Business Administration at 13 CFR Part 121.

7. Consequences of Less Frequent Collection

The information which will be collected is required on a one-time basis to ensure that public health and safety is protected from the risk of a core-melt accident.

8. Circumstances Which Justify Variations From OMB Guidelines

This proposed rule varies from OMB guidelines due to record retention periods beyond 3 years. Life-time (of plant license) retention of the above-specified records is necessary to ensure that the health and safety of public is adequately protected from possible risks associated with plant shutdown and low-power operations.

9. Consultation Outside the NRC

Industry-wide initiatives include workshops, Institute of Nuclear Power Operations (INPO) inspections, Electric Power Research Institute (EPRI) support, as well as enhanced training and

procedures. One activity (a formal initiative proposed by the Nuclear Energy Institute (NEI), formerly the Nuclear Management and Resources Council (NUMARC), has produced for the utilities a set of guidelines to use for the self-assessment of shutdown operations.

In addition, in the Federal Register notice of proposed rulemaking, the NRC has specifically requested comments describing the possible alternate methods for equipment controls. Also, the current regulatory analysis only addresses changes to the limiting conditions of operation or the surveillance requirements within the technical specifications, and does not reflect the risk reduction already achieved by industry through voluntary actions. The NRC has requested information as to steps that licensees have already taken to reduce risk during shutdown and low-power operations. Finally, the NRC has solicited comments on the use of probabilistic risk assessment (PRA) information and the calculation of the value of offsite dose (accident consequence) in the cost/benefit analysis.

10. Confidentiality of Information

Information identified as proprietary or confidential would be handled in accordance with 10 CFR 2.790 of the NRC regulations. However, this information is usually not submitted as confidential.

11. Justification for Sensitive Questions

This proposed rule does not request sensitive information.

12. Estimate of the Cost to the Federal Government

Licensees for all 74 nuclear power plant sites are expected to include the controls required by 50.67 in plant procedures. Thus, no Federal burden is projected for including the controls in plant technical specifications, which would require review and approval by NRC prior to implementation by licensees. Including the required controls in plant procedures, as well as the other information collections included in 50.67, would result in only records maintained by licensees. The incremental cost of NRC audits and inspection of these records is a small part of the total NRC inspection program consisting of the resident inspectors, regional inspections, and special inspections.

13. Estimate of Industry Burden and Costs

Based on the above projection that licensees for all 74 sites will elect to include the controls required by 50.67 in plant procedures (50.67(c)(iii)(B)), no burden is estimated for including the controls in plant technical specification (50.67(c)(iii)(A)). The estimated one-time burden for including controls in plant procedures is 222,000 hours (3,000 hours per site). Licensees for all 74 sites also are expected to require approximately 8,880 hours (120 hours per site) to prepare the evaluation of fire protection features as required by 50.67(c)(4). Also, for any licensee choosing to develop

the contingency plan, as described in 50.67(c)(4)(ii), the burden is expected to be 40 hours. As many as 37 licensees are expected to develop contingency plans, for a total burden of 1480 hours.

Based on the above estimates, the total one-time burden and cost to industry is 232,360 hours at a total cost of \$30,903,880 (232,360 burden hours x \$133/hour).

Also see attached Tables 1 and 2.

14. Reasons for Change in Burden

The burden estimate for 10 CFR Part 50 has been adjusted upward to account for the reporting and recordkeeping activities associated with proposed rule 50.67.

15. Publication for Statistical Use

The information is not published for statistical purposes.

B. COLLECTIONS OF INFORMATION EMPLOYING STATISTICAL METHODS

Statistical methods are not employed in this information collection.

Attachment:
Tables 1 and 2

ANNUAL REPORTING REQUIREMENTS

Requirements	No. of Licensees	Burden per Licensee	Total Industry Burden	Total Gov't Burden
50.67 (c)(3)(iii)(A) Controls for identified equip. included in plant TSs	0	0	0	0

Estimate of Cost to Industry for Reporting - 0

Estimate of Cost to Federal Government for Reporting - 0

ANNUAL RECORDKEEPING REQUIREMENTS

Requirements	No. of Licensees	Burden per Licensee (hrs)	Total Industry Burden (hrs)	Total Gov't Burden
50.67(c)(3)(i) Identify equip.		Burden included under 50.67(c)(3)(iii)(A) and (B)		-
50.67(c)(3)(iii)(B) Controls for identified equip. included in plant procedures	74 (sites)	3,000	222,000	-
50.67(c)(4) Evaluation of fire protection features	74 (sites)	120	8,880	-
50.67(c)(4)(ii) Contingency plan	37 (sites)	<u>40</u> 3,160	<u>1,480</u> 232,360	-

 Estimate of Cost to Industry for Recordkeeping - \$30,671,520 (232,360 x \$132)

Estimate of Cost to Federal Government for Recordkeeping - Negligible as records are inspected as part of the routine inspection effort.

 Total Burden and Cost to Industry: 232,360 hours (\$30,671,520)

Total Burden and Cost to Government: 0

NUCLEAR REGULATORY COMMISSION

10 CFR Part 50

RIN 3150-AE97

Shutdown and Low-Power Operations for Nuclear Power
Reactors

AGENCY: Nuclear Regulatory Commission.

ACTION: Proposed rule.

SUMMARY: The Nuclear Regulatory Commission (NRC) is proposing to amend its regulations to require power reactor licensees to: (1) Assure that uncontrolled changes in reactivity, reactor coolant inventory, and loss of subcooled state in the reactor coolant system when subcooled conditions are normally being maintained, will not occur when the plant is in either a shutdown or low power condition; (2) Assure that containment integrity is maintained or can be reestablished in a timely manner as needed to prevent releases in excess of the current limits in the regulations when the plant is in either a shutdown or low power condition; (3) Establish controls in technical specifications limiting conditions for operation and surveillance requirements or plant procedures required by technical specifications administrative controls for equipment which the licensee identifies as necessary to perform their safety function when the plant is in a shutdown or low power condition; (4) Evaluate realistically the effect of fires stemming from activities conducted during cold shutdown or refueling conditions, determine whether such fires could realistically prevent accomplishment of the normal decay heat removal capability, and if so, either provide measures to prevent

loss of normal decay heat removal or establish a contingency plan that would ensure that an alternate decay heat removal capability exists; and (5) For licensees of PWRs only, provide instrumentation for monitoring water level in the RCS during midloop operation. The proposed amendments would provide substantial additional protection to public health and safety from the risk of a core-melt accident.

DATE: The comment period expires 75 days from the date of publication. Comments received after this date will be considered if it is practical to do so, but the Commission is able to assure consideration only for comments received on or before this date.

ADDRESSEES: Mail written comments to: Secretary, U.S. Nuclear Regulatory Commission, Washington, DC 20555-0001, ATTN: Docketing and Service Branch.

Deliver comments to: 11555 Rockville Pike, Rockville, Maryland, between 7:45 am and 4:15 pm Federal workdays.

Copies of comments received may be examined and copied for a fee at the NRC Public Document Room, 2120 L Street, NW (Lower Level), Washington, DC.

FOR FURTHER INFORMATION CONTACT: Gary M. Holahan, Director, Division of Systems Safety and Analysis, Office of Nuclear Reactor Regulation, U.S. Nuclear Regulatory Commission, Washington, DC 20555-0001, Telephone: (301) 504-2884.

SUPPLEMENTARY INFORMATION:

Background

Over the past several years, the Nuclear Regulatory Commission (NRC) staff has become increasingly concerned about the safety of operations during the shutdown of nuclear power reactors. The loss of decay heat removal (DHR) during shutdown and refueling has been a continuing problem. In 1980, DHR was lost at the Davis-Besse plant when one residual heat removal (RHR) pump failed and the second pump was out of service. After reviewing the Davis-Besse event and studying the operating requirements that existed at the time of the event, the NRC issued Bulletin 80-42 and Generic Letter (GL) 80-43 calling for new technical specifications to ensure that one RHR system is operating and a second is available (i.e., operable) for most shutdown conditions. The Diablo Canyon event of April 10, 1987, highlighted the fact that midloop operation was a particularly sensitive condition with respect to operability of the residual heat removal pumps. In this event, the reactor coolant system was overdrained during midloop operation. The resulting low water level in the reactor vessel caused vortexing and air entrainment and loss of both residual heat removal pumps. After reviewing the event, the staff issued GL 88-17, recommending that

licensees address numerous generic deficiencies to improve the reliability of the DHR capability. More recently, the incident investigation team's report on the loss of ac power at the Vogtle plant (NUREG-1410) emphasized the need for risk management of shutdown operations. Furthermore, discussions with foreign regulatory organizations (i.e., French and Swedish authorities) about their evaluations regarding shutdown risk have reinforced previous NRC staff findings that the core-damage probability (CDP) for shutdown operation can be a fairly substantial fraction of the total CDP. Because of these concerns regarding operational safety during shutdown, the NRC conducted a careful, detailed evaluation of safety during shutdown and low-power operations which is documented in NUREG-1449.

Objective

The NRC staff's comprehensive evaluation of shutdown and low-power operations, documented in NUREG-1449, included observations and inspections at a number of plants, analysis of operating experience, deterministic safety analysis, and insights from probabilistic risk assessments. It was observed that shutdown risks have been reduced at many plants through improvements to outage programs. However, the improvements have been unevenly and inconsistently applied across the industry. From this evaluation, the NRC has concluded that public health and safety have been adequately protected during the period that plants have been in shutdown and low power conditions; but that substantial safety improvements are possible and NRC requirements are warranted for the following reasons:

- (1) A regulatory requirement would set minimum standards for all plants and would ensure that safety improvements already made by industry will be applied consistently throughout the industry and will not be eroded in the future.
- (2) A regulatory requirement would further reduce risk by improving safety in the areas of fire protection for all plants and midloop operation for PWRs.
- (3) Significant precursor events involving loss of DHR capability continue to occur despite efforts to resolve the problem.
- (4) Some controls, including regulatory controls, have been significantly lacking and have in the past allowed plants to enter circumstances that would likely challenge safety functions with minimal mitigation equipment available and containment integrity not established.

The NRC has identified possible regulatory actions to address these problems and subjected them to a regulatory analysis which also addresses the requirements for a backfit analysis under 10 CFR 50.109.¹ These actions have been evaluated within the framework of the Commission's Safety Goal Policy, (51 FR 30028; August 21, 1986) to determine whether or not they would result in a substantial increase in the overall protection of the public health and safety.

The NRC has observed that many shutdown operations may take place with the containment partially open. Therefore, cost-effective regulatory actions are appropriate to ensure substantial reduction in core-damage probability, and an improvement in the likelihood of containment isolation, when necessary. These actions would substantially increase the overall protection of public health and safety.

¹ The current regulatory analysis only addresses the LCO and SR option for controls for specific equipment relied upon during shutdown and low-power operations, whereas the proposed rule allows for incorporation of controls included in technical specifications limiting conditions for operation and surveillance requirements in accordance with 10 CFR 50.36(c)(2) and (3), or plant procedures required by technical specifications administrative controls pursuant to 10 CFR 50.36(c)(5). The staff plans to revise the regulatory analysis to incorporate consideration of other alternatives as appropriate for equipment controls during shutdown and low-power operations. In addition, the staff will consider the following in the revised regulatory analysis: (1) insights gained from the recent NRC PRAs for shutdown and low-power operations at Surry and Grand Gulf (2) industry improvements made in outages (3) comments received from ACRS, CRGR and the Commission (4) specific industry comments on the draft regulatory analysis documented in a letter from NUMARC dated January 11, 1994, in a letter from NEI dated March 28, 1994 and in a letter from CEOG dated April 8, 1994.

Operating Experience

The NRC staff reviewed operating experience at nuclear power plants to ensure that its evaluation encompassed the range of events encountered during shutdown and low-power operations including: licensee event reports (LERs), studies performed by the Office for Analysis and Evaluation of Operational Data (AEOD), and various inspection reports to determine the types of events that take place during refueling, cold and hot shutdown, and low-power operations.

The NRC staff also reviewed events that occurred at foreign nuclear power plants using information found in the foreign events file maintained for AEOD at the Oak Ridge National Laboratory (ORNL). The AEOD compilation included the types of events that applied to U.S. nuclear plants and those not found in a review of U.S. experience.

In performing this review, the NRC staff found that the more significant events for pressurized-water reactors (PWRs) were the loss of residual heat removal, potential pressurization, and boron dilution events. The more important events for boiling-water reactors (BWRs) were the loss of coolant, the loss of cooling, and potential pressurization. Generally, the majority of important events involved human error and procedural errors. The NRC staff documented this review in NUREG-1449. In addition, the NRC staff selected 10 events from the AEOD review for further assessment as precursors to potential severe core-damage accidents. This assessment is fully documented in NUREG-1449.

Further, undesirable events continue to occur during shutdown operations. Recent operating experiences during shutdown include (1) entry into midloop operation with a degraded RHR pump at a PWR on December 11, 1993, (2) the discovery of a large, undetected nitrogen gas bubble in the RCS during extended cold shutdown at a PWR on December 17, 1993, (3) a hydrogen burn in an empty pressurizer caused by welding activities during cold shutdown at a PWR on February 3, 1994, and (4) the loss of one train of RHR 2 days after shutdown due to outage activities at a BWR on March 17, 1994. These recent events reinforce the previous assessment of shutdown operations documented in NUREG-1449.

Industry Work

The industry has addressed outage planning and control with programs that include workshops, Institute of Nuclear Power Operations (INPO) inspections, Electric Power Research Institute (EPRI) support, as well as enhanced training and procedures. One activity (a formal initiative proposed by the Nuclear Management and Resources Council (NUMARC)) has produced for the utilities a set of guidelines to use for self-assessment of shutdown operations (NUMARC 91-06).² This high-level guidance addresses many, but not all, of the areas in outage planning that need improvement. Detailed guidance on developing an outage planning program is outside the scope of the NUMARC effort. The NRC staff

² These guidelines serve as the basis for an industry-wide program that has been implemented at all plants.

believes that NUMARC 91-06 represents a significant and constructive step, effects of which have already been realized by many utilities using the draft guidance in recent outages.³ For example, on the basis of its review of operating experience and pilot team inspections, the staff observed that industry efforts and improvements have been made which should reduce risk in the shutdown and low-power operations area. Some licensees were observed to have in-depth contingency planning for backup cooling; other licensees were found to have well-planned and tightly conducted outages run by outage-experienced, operationally oriented personnel; and other licensees had developed well-defined strategies and procedures for plant and hardware configurations, including fuel offload, midloop operation in PWRs, use of nozzle dams in PWRs, venting in PWRs, electrical equipment, onsite sources of ac power, containment status and control, and such key instrumentation as RCS temperature, reactor water level, and RCS pressure. Further, industry's defense-in-depth concept for safety functions and outage strategy contained in NUMARC 91-06 have been recognized as excellent self-improvements in the shutdown and low-power operations area. However, implementation of these efforts and improvements has been unevenly and inconsistently applied, as observed at several site inspections conducted by the staff.

³ NUMARC 91-06 is available from Nuclear Energy Institute, 1776 Eye Street, N.W., Suite 400, Washington, DC 20006-3708.

Safety Importance

The NRC's staff's rationale for proposing the requirements described previously is that they will provide substantial safety improvements, and the costs of implementation are justified in view of the benefits to be provided. This judgment is based on a qualitative assessment supplemented by a quantitative analysis. The considerations that principally support the proposed action are as follows:

- (1) The improvements reflect the NRC safety philosophy of "defense in depth" in that they address: (a) prevention of credible challenges to safety functions through improvements in operations and fire protection; and (b) mitigation of challenges to redundant protection systems, through improved procedures, training, improved controls on plant equipment and contingency plans.
- (2) Accident sequences during shutdown which are as rapid and severe as those that might occur during power operation should be addressed with commensurate requirements. This is supported by the staff's engineering analysis of accidents during shutdown conditions documented in NUREG-1449.
- (3) The improvements being proposed are aimed directly at problems that have been repeatedly observed in operating experience, e.g., loss of decay heat removal, loss of ac

power, loss of RCS inventory, fires, personnel errors, poor procedures and poor planning, and lack of training.

Only a very limited number of probabilistic risk assessment (PRA) studies covering shutdown conditions have been performed and those studies contain considerable uncertainty. The uncertainty is due largely to the predominant role played by operators and other licensee staff in shutdown events and recovery from them. Human reliability is difficult to quantify, especially under unfamiliar conditions which are often not covered in training or procedures. The collection of PRA studies discussed in NUREG-1449 gives some insight into the likely range of shutdown risks for the spectrum of current plants. The mean CDP for shutdown events appears to be in the range of $6E-05$ to $7E-06$ per reactor-year. Although detailed uncertainty analysis is not available for most of the PRAs covering shutdown conditions, some insight can be gained by examining the uncertainty analysis in NUREG-1150 where the CDP uncertainty ranges (5th and 95th percentiles) are approximately one order of magnitude. From this limited information, the staff concludes that a reasonable estimate of the range of CDP is $1E-04$ to $1E-06$ per reactor-year.

On the basis of the analysis of operating experience in NUREG-1449, including the accident sequence precursor analysis, the NRC staff identified the following as dominant event sequences during shutdown: loss of all ac power, loss of RCS inventory, and loss of reactor vessel level control in PWRs. These sequences have been modeled as part of the regulatory analysis of proposed improvements in shutdown and low-power operations. Core-

damage probabilities for these sequences are point estimates built from best estimates of each step in the sequence. No uncertainty analysis was performed because of the lack of reliable statistical data for shutdown conditions. However, a sensitivity study has been performed to assess the effect of uncertain assumptions on the overall results of the analysis. The results of the sensitivity study show that despite sensitivity to changes in PRA assumptions, the estimated changes in risk associated with the proposed improvements remain significant even when inputs are changed significantly.

The results of the analysis of the dominant event sequences indicate potential reductions in core-damage probability of greater than $5E-05$ per reactor-year for each PWR's improvement, and approximately $1E-05$ per reactor-year for improvement to BWRs. As previously stated, the staff recognizes that significant improvement in core-damage probability has already been achieved through recent industry actions, however, the proposed rule would place a regulatory "footprint" on outage safety and codify improvements made by industry to ensure that (1) reductions in risk already achieved are not eroded in the future and (2) consistency and uniform achievement of the safety improvements is realized throughout the industry. The proposed rule would also set minimum standards for all plants and further reduce risk by improving safety in the areas of fire protection for shutdown decay heat removal and effective reactor vessel water level instrumentation for PWRs in midloop operation.

Containment capability and releases of radioactivity for accident sequences during shutdown are also evaluated as part of the regulatory analysis. From that work, the NRC has concluded that an intact containment will effectively prevent early releases from shutdown accidents. Large, dry PWR containments should remain intact if closed before being challenged. Severe core-damage accidents in open containments or in containments that fail are expected to have offsite consequences similar to severe core-damage accidents initiating from power operations. Onsite consequences within a few hundred meters of open or failed containments may be more severe at shutdown than at power. The potential dose to the public for a severe core-damage accident without an effective containment was estimated to be $2E+06$ person-rem ($2E+04$ person-Sv).

Basis for Commission Position

The NRC proposes to resolve concerns regarding shutdown and low-power operations by rulemaking that would require power reactor licensees to:

(1) Assure that uncontrolled changes in reactivity, reactor coolant inventory, and loss of subcooled state in the reactor coolant system when subcooled conditions are normally being maintained, will not occur when the plant is in either a shutdown or low-power condition;

(2) Assure that containment integrity is maintained or can be reestablished in a timely manner as needed to prevent releases in excess of the guidelines of 10 CFR Part 100 when the plant is in either a shutdown or low-power condition;

(3)(i) Identify that equipment necessary to make the reactor subcritical or critical in a controlled manner and maintain it subcritical in a shutdown condition, and

(ii) Establish controls in either technical specifications limiting conditions for operation and surveillance requirements in accordance with the requirements of 10 CFR 50.36(c)(2) or plant procedures required by technical specifications administrative controls pursuant to 10 CFR 50.36(c)(5) for that equipment such that they will ensure each safety function when the plant is in a shutdown or low power condition;

(4) Prior to (and throughout the shutdown refueling outage as necessary to accommodate unforeseen contingencies) entering cold shutdown or a refueling condition, evaluate realistically available fire-protection features and the outage plan for possible fires stemming from activities conducted during cold shutdown or refueling conditions, determine whether such fires could realistically prevent accomplishment of the normal decay heat removal capability during cold shutdown or refueling conditions, and if so, either take measures to prevent loss of normal decay heat removal by such fires during cold shutdown or a refueling condition, or have a contingency plan in place that will ensure an alternate decay heat removal capability exists and that will describe the general steps to connect the alternate decay heat removal system to the reactor coolant system (RCS); and

(5) For licensees of PWRs only, provide instrumentation for monitoring water level in the RCS during midloop operation.

The technical basis for the NRC's staff's position is derived from the NRC staff's comprehensive evaluation of shutdown and low-power issues in NUREG-1449, "Shutdown and Low-Power Operations at Nuclear Power Plants in the United States." NUREG-1449 was published as a draft report for comment in February 1992. The comment period on the draft NUREG-1449 ended on April 30, 1992, and a large number of comments were received from utilities and industry organizations. The NRC staff addressed the comments in the final report (NUREG-1449) which was issued in September 1993. The principal findings from NUREG-1449 that support the NRC regulatory position in this proposed rule are the following:

(1) Accident sequences during shutdown can be as rapid and severe as those during power operations.

(2) All PWR containments and BWR (boiling-water reactor) Mark III primary containments are capable of offering significant protection if the containment is closed or can be closed quickly. However, analyses show that the steam and radiation environment in the containment, which can result from an extended loss of DHR or LOCA, would make it difficult to close the containment in many cases. BWR Mark I and II secondary

containments offer less protection against an accident, but this is offset by a significantly lower likelihood of core damage in BWRs than in PWRs.

(3) Outage planning is crucial to safety during shutdown conditions since it establishes (a) if and when a licensee will enter circumstances likely to challenge safety functions and (b) the level of mitigation equipment available.

(4) Using technical specifications to control the availability of safety-related equipment is appropriate because (i) operators are trained and accustomed to operating the facility in accordance with approved procedures within the clear limits set by technical specifications and (ii) technical specifications establish clear and enforceable regulatory requirements.⁴

(5) Although maintenance activities that can increase the potential for fire are performed during shutdown, current NRC requirements in the area of fire protection do not apply to shutdown conditions.

⁴ The NUREG-1449 analysis only addressed the use of technical specifications for control of specific equipment relied upon during shutdown and low-power operations. The proposed rule allows for incorporation of controls using either technical specifications limiting conditions for operation and surveillance requirements in accordance with the requirements of 10 CFR 50.36(c)(2) and (3), or plant procedures required by technical specifications of administrative controls pursuant to 10 CFR 50.36(c)(5).

(6) Operating experience continues to show that the ability to maintain control of RCS level in PWRs during draindown and steady-state operation has been a problem. The principal contributor to events during some shutdown configurations has been identified as poor quality and reliability of reactor vessel level instrumentation. This problem is most significant during midloop operation, where a small variation in level can lead to a loss of DHR. PRAs have consistently found a higher risk associated with midloop operation than with other operational states.

The requirements being proposed by the NRC are aimed directly at problems that have been repeatedly observed in operating experience, such as loss of decay heat removal, loss of ac power, loss of RCS inventory, fires, personnel errors, poor procedures, poor planning, and poor training. The proposed requirements reflect the NRC safety philosophy of defense in depth, in that they address: (1) prevention of credible challenges to safety functions through improvements in operations, fire protection and water level instrumentation in PWRs and (2) mitigation of challenges to redundant protection systems, through improved equipment controls.

Equipment controls must be included in either technical specifications limiting conditions for operation and surveillance requirements in accordance with the requirements of 10 CFR 50.36(c)(2) and (3), or plant procedures required by technical specifications administrative controls pursuant to 10 CFR 50.36(c)(5). Requirements for specific equipment availability using plant procedures would be established by the licensee in a way

that provides maximum flexibility by: (1) permitting the use of non-safety as well as safety equipment to provide safety functions; (2) permitting reduced decay heat levels to be a factor in developing such mitigating strategies as the selection of protective features and determination of when to put such protective features into service; and (3) allowing changes regarding the availability of equipment during the outage to be made without prior NRC review and approval. This particular resolution path has not been evaluated explicitly in the regulatory analysis; but the NRC believes that this approach to controlling mitigative equipment can produce a safety benefit comparable to that for the LCO approach.

Relationship to Existing Requirements

Technical Specifications

Section 50.67(c)(3)(iii) of the proposed rule may result in changes to plant-specific technical specifications as well as to the standard technical specifications documented in NUREG-1430, NUREG-1431, NUREG-1432, NUREG-1433, and NUREG-1434 (STS for Babcock & Wilcox plants, Westinghouse plants, Combustion Engineering plants, General Electric BWR/4 plants, and General Electric BWR/6 plants, respectively). Section 50.67(c)(3)(iii) of the proposed rule requires identified equipment controls during shutdown or low-power conditions to be established in technical specifications or plant procedures required by technical specifications administrative controls in support of specific safety functions, including such support functions as electric power. Section 50.67(c)(3)(ii) states

that the controls must reflect sufficient redundancy in systems, subsystems, components, and features to ensure that, for the onsite electric power system in operation (assuming offsite power is not available), safety functions can be accomplished, assuming a single failure. LCOs currently used at some plants do not cover all of the safety functions recommended in the proposed rule. For some systems, under some conditions, standard technical specifications, as well as current plant-specific technical specifications, lack the redundancy called for in the proposed rule.

Fire Protection

The principal regulation covering fire protection is 10 CFR 50.48. It requires all plants to have a fire protection plan that satisfies General Design Criterion (GDC) 3 of Appendix A to 10 CFR Part 50. Appendix R to 10 CFR Part 50 gives specific requirements to be satisfied in complying with the regulation for plants licensed before 1979. Additionally, guidance for satisfying the regulation is found in the branch technical positions referenced in the regulation. However, this guidance was developed to ensure that the plant could be brought to a hot shutdown condition from power operation during a fire and does not address the condition of being in a shutdown or refueling mode at the time of a fire. Further, fire-protection criteria established by the regulations only require that at least one train of those systems important for ensuring an adequate level of DHR during cold shutdown and refueling be capable of being restored to service within 72 hours of a fire. In addition, NRC guidelines for performing a fire hazards analysis do not address shutdown and

refueling conditions, or the potential impact a fire may have on the capability to maintain shutdown cooling.

With the proposed requirements in the area of fire protection during cold shutdown or refueling conditions, it is the Commission's intent to supplement current requirements for fire protection with additional requirements to ensure that decay heat removal capability is not lost because of a fire during cold shutdown or refueling conditions. If the evaluation required by the proposed rule shows that fires would prevent accomplishment of normal decay heat removal capability, the licensee must either take measures to prevent the loss of normal decay heat removal by such fires or have a contingency plan in place that will ensure that an alternate decay heat removal capability exists during cold shutdown or a refueling condition. The contingency plan should describe the general steps to connect the alternate decay heat removal system to the RCS. The NRC staff recognizes that this could be done by revising existing regulations to include detailed supplemental requirements. However, the proposed requirements state that realistic fires during cold shutdown and refueling conditions should be evaluated rather than the more conservative fires that are analyzed under Appendix R. This realistic evaluation of available fire-protection features and the outage plan for possible fires should serve as the basis for further appropriate action. Permanent hardware fixes need not be employed as an option to reduce the risk of fire during cold shutdown and refueling conditions. On the contrary, if the evaluation results in the conclusion that some changes must be made, the licensee should consider less onerous options to reduce the risk of

fire such as: (a) modifying or relocating the activities that might cause the fire; (b) constructing temporary fire barriers; or (c) revising plant procedures.

Instrumentation

The NRC believes the proposed action regarding installation in a PWR of new reactor vessel water level instrumentation, including an alarm, is a cost-justified substantial safety enhancement and the costs of implementation are justified in the view of the substantial benefit that is provided.⁵ This action stems from a desire to eliminate losses of the RHR system due to air ingestion caused by operator error when lowering water level to achieve a midloop condition. The additional level instrumentation would supplement the improved level instrumentation adopted voluntarily by all affected licensees in response to GL 88-17, "Loss of Decay Heat Removal."

⁵ The staff's regulatory analysis includes the assumption that BWR water level instrumentation will be operable during cold shutdown and refueling operations in accordance with current standard technical specifications. The results of the analysis support the conclusion that improvements in BWR water level instrumentation used during shutdown operations are not warranted. Recent concerns with the accuracy of BWR water level instrumentation are being addressed by utilities with actions in response to NRC Bulletin 93-03, dated May 28, 1993. Those actions will ensure that BWR water level instrumentation will function as assumed in the regulatory analysis.

Expected Achievement

The NRC notes that, based on the available evidence, no undue public risk exists without the promulgation of the rule for shutdown and low-power operations. The proposed rule would strengthen safety by preventing accidents and mitigating accidents, and thereby reduce the likelihood of a core-damage accident and the offsite releases due to loss of a key safety function during shutdown or low-power operations. Significant improvements have already been achieved in this regard through the implementation of the NUMARC guidelines; however, the proposed rule would place a regulatory "footprint" on outage safety and codify improvements made by industry to ensure that (1) reductions in risk already achieved are not eroded in the future and (2) consistency and uniform achievement of the safety improvements is realized throughout the industry. The proposed rule would also set minimum standards for all plants and further reduce risk by improving safety in the areas of fire protection for shutdown decay heat removal and effective reactor vessel water level instrumentation for PWRs in midloop operation. Moreover, the overall risk may also be reduced by additional improvements in severe accident management, given the assumption that core damage occurs, whether from an event during an outage or during power operations. Therefore, the proposed rule should be viewed as being in the same accident prevention context as the ATWS rule (10 CFR 50.62) and the station blackout rule (10 CFR 50.63) in that it recognizes, as the other two rules recognize, multiple failure possibilities resulting from common cause effects that should be addressed.

Comments-Requested

Section 50.67(c)(3)(i) of the proposed rule calls for the identification of equipment necessary to (a) make the reactor subcritical or critical in a controlled manner and maintain the reactor subcritical in a shutdown condition, (b) maintain RCS inventory and capability to add makeup water to the reactor vessel, (c) remove decay heat from the reactor, (d) monitor water level in the reactor vessel, and (e) maintain or reestablish containment integrity when the plant is in a shutdown or low-power condition. Further, Section 50.67(c)(3)(ii) of the proposed rule requires licensees to establish controls for the equipment identified such that they will perform their safety function when the plant is in a shutdown or low power condition. The controls must reflect sufficient redundancy in systems, subsystems, components, and features to ensure that, for the onsite electric power system in operation (assuming offsite power is not available), safety functions can be accomplished, assuming a single failure, for all conditions except refueling operations (with water level above the reactor in excess of a lower limit established in applicable technical specifications or plant procedures). Section 50.67(c)(3)(iii) of the proposed rule specifies that the controls required by paragraph (c)(3)(ii) be included in technical specifications limiting conditions for operation and surveillance requirements in accordance with the requirements of 10 CFR 50.36(c)(2) and (3), or plant procedures required by technical specifications administrative controls pursuant to 10 CFR 50.36(c)(5). The NRC would like to receive comments describing the possible alternate methods for equipment controls. Additionally, the current regulatory analysis only addresses LCO and SR changes within the technical specifications, and does not

reflect the risk reduction already achieved by industry through voluntary actions. The Commission requests information as to steps that licensees have already taken to reduce risk during shutdown and low-power operations. Finally, the NRC would like to receive comments on the use of probabilistic risk assessment (PRA) information and the calculation of the value of offsite dose (accident consequence) in the cost/benefit analysis.

Availability of Documents

Copies of all NRC documents, including generic issue (GI) notices are available for public inspection and copying for a fee at the NRC Public Document Room (PDR) at 2120 L Street, N.W. (Lower Level) Washington, DC 20555-0001.

Copies of NUREGs-1150, 1410, 1430, 1431, 1432, 1433, 1434, and 1449 may be purchased from the Superintendent of Documents, U.S. Government Printing Office, by calling (202) 275-2060 or by writing to the Superintendent of Documents, U.S. Government Printing Office, Mail Stop SSOP, Washington, DC 20402-9328. Copies are also available from the National Technical Information Service, 5825 Port Royal Road, Springfield, VA 22161.

Criminal Penalties

For purposes of section 223 of the Atomic Energy Act of 1954, as amended (AEA), the Commission proposes to issue the proposed rule under one or more of sections 161b, 161i, or 161o of the AEA. Willful violations of the rule are subject to criminal enforcement.

Finding of No Significant Environmental Impact: Availability

The Commission has determined under the National Environmental Policy Act of 1969, as amended, and the Commission's regulations in Subpart A of 10 CFR Part 51, that this rule, if adopted, does not degrade the environment in any way. The actions resulting from this rule, if adopted, would reduce the core damage frequency and risks during shutdown and low-power operations. Therefore, the Commission concludes that there will be no significant impact on the environment from this proposed rule. This discussion constitutes the environmental assessment and finding of no significant impact for this proposed rule; a separate assessment has not been prepared.

Paperwork Reduction Act Statement

This proposed rule amends information collection requirements that are subject to the Paperwork Reduction Act of 1980 (44 U.S.C. 3501 et seq.). The rule has been submitted to

the Office of Management and Budget for review and approval of the information collection requirements.

The public reporting burden for this collection of information is estimated to average 3160 hours per respondent, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing the burden, to the Information and Records Management Branch (T-6 F 33), U.S. Nuclear Regulatory Commission, Washington, DC 20555-0001, and to the Desk Officer, Office of Information and Regulatory Affairs, NEOB-10202, (3150-0011), Office of Management and Budget, Washington, DC 20503.

Regulatory Analysis

The Commission has prepared a draft regulatory analysis⁶ for this proposed rule that examines the costs and benefits of the alternatives considered. This analysis is documented in a report entitled, "Regulatory Analysis in Accordance with 10 CFR 50.109: Requirements for Shutdown and Low-Power Operations at Nuclear Power Plants," and is available for inspection in the NRC Public Document Room, 2120 L Street, N.W. (Lower Level), Washington, DC. Single copies of the analysis may be obtained from Kulin Desai, Division of Systems Safety and Analysis, Office of Nuclear Reactor Regulation, U.S. Nuclear Regulatory Commission, Washington, DC 20555-0001, Telephone: (301) 504-2835.

The Commission requests public comments on the proposed rule, draft Regulatory Guide, "Shutdown and Low-Power Operations at Nuclear Power Plants," and the draft report documenting the regulatory analysis, entitled, "Regulatory Analysis in Accordance with 10

⁶ The current regulatory analysis only addresses the LCO and SR Option for controls for specific equipment relied upon during shutdown and low-power operations, whereas the proposed rule allows for incorporation of controls including technical specifications limiting conditions for operation and surveillance requirements in accordance with 10 CFR 50.36(c)(2) and (3), or plant procedures required by technical specifications administrative controls pursuant to 10 CFR 50.36(c)(5). The staff plans to revise the regulatory analysis to incorporate consideration of other alternatives as appropriate for equipment controls during shutdown and low-power operations. In addition, the staff will consider the following in the revised regulatory analysis: (1) insights gained from the recent NRC PRAs for shutdown and low-power operations at Surry and Grand Gulf (2) industry improvements made in outages (3) comments received from ACRS, CRGR and the Commission (4) specific industry comments on the draft regulatory analysis documented in a letter from NUMARC dated January 11, 1994, in a letter from NEI dated March 28, 1994 and in a letter from CEOG dated April 8, 1994.

CFR 50.109: Requirements for Shutdown and Low-Power Operations at Nuclear Power Plants."

Regulatory Flexibility Certification

In accordance with the Regulatory Flexibility Act of 1980, (5 U.S.C. 605(b)), the Commission certifies that, if promulgated, this proposed rule would not have a significant economic impact on a substantial number of small entities. This proposed rule would affect only the licensing and operation of nuclear power plants. The companies that own these plants do not fall within the scope of the definition of "small entities" as given in the Regulatory Flexibility Act or the Small Business Size Standards in regulations issued by the Small Business Administration at 13 CFR Part 121.

Backfit Analysis

As required by 10 CFR 50.109, a backfit analysis has been performed for the proposed rule. The backfit analysis on which this determination is based is included in the report entitled, "Regulatory Analysis in Accordance with 10 CFR 50.109: Requirements for Shutdown and Low-Power Operations at Nuclear Power Plants," dated December 1993. The backfit analysis approach emphasized a qualitative estimation supplemented by a quantitative analysis for bounding conditions as reflected in the regulatory analysis. The backfit analysis and the regulatory analysis will be revised based on comments received from the public.

The Commission has determined, based on this analysis, that backfitting to comply with the requirements of this proposed rule will provide a substantial increase in protection to public health and safety because it would: (1) reduce the frequency of events caused by poor planning and control of activities during outages; (2) ensure availability of key safety functions during shutdown and low-power operations at all plants; (3) ensure that a method of decay heat removal remains viable in the event of a fire in any plant area during cold shutdown or refueling conditions; and (4) provide accurate instrumentation for PWRs to use when draining the reactor coolant system to a midloop configuration to avoid air binding and eventual loss of residual heat removal pumps. The Commission has further determined the cost of implementing the new requirements is justified for PWRs in view of the increase in protection attributable to the proposed backfits but plans to specifically reassess BWRs following consideration of comments on this proposed rulemaking.

List of Subjects

Antitrust, Classified information, Criminal penalties, Fire protection, Intergovernmental relations, Nuclear power plants and reactors, Radiation protection, Reactor siting criteria, Reporting and recordkeeping requirements.

For the reasons given in the preamble and under the authority of the Atomic Energy Act of 1954, as amended, the Energy Reorganization Act of 1974, as amended and 5 U.S.C. 553, the NRC is proposing to adopt the following amendments to 10 CFR Part 50.

PART 50 - DOMESTIC LICENSING OF PRODUCTION AND UTILIZATION
FACILITIES

1. The authority citation for Part 50 continues to read as follows:

AUTHORITY: Secs. 102, 103, 104, 105, 161, 182, 183, 186, 189, 68 Stat. 936, 937, 938, 948, 953, 954, 955, 956, as amended, sec. 234, 83 Stat. 1244, as amended (42 U.S.C. 2132, 2133, 2134, 2135, 2201, 2232, 2233, 2236, 2239, 2282); secs. 201, as amended, 202, 206, 88 Stat. 1242, as amended, 1244, 1246 (42 U.S.C. 5841, 5842, 5846).

Section 50.7 also issued under Pub. L. 95-601, sec. 10, 92 Stat. 2951 as amended by Pub. L. 102-486, Sec. 2902, 106 Stat. 3123 (42 U.S.C. 5851). Section 50.10 also issued under secs. 101, 185, 68 Stat. 936, 955, as amended (42 U.S.C. 2131, 2235); sec. 102, Pub. L. 91-190, 83 Stat. 853 (42 U.S.C. 4332). Sections 50.13, 50.54(dd), and 50.103 also issued under sec. 108, 68 Stat. 939, as amended (42 U.S.C. 2138). Sections 50.23, 50.35, 50.55, and 50.56 also issued under sec. 185, 68 Stat. 955 (42 U.S.C. 2235). Sections 50.33a, 50.55a and Appendix Q also issued under sec. 102, Pub. L. 91-190, 83 Stat. 853 (42 U.S.C. 4332). Sections 50.34 and 50.54 also issued under sec. 204, 88 Stat. 1245 (42 U.S.C. 5844). Sections 50.58, 50.91, and 50.92 also issued under Pub. L. 97-415, 96 Stat. 2073 (42 U.S.C. 2239). Section 50.78 also issued under sec. 122, 68 Stat. 939 (42 U.S.C. 2152). Sections 50.80-50.81 also issued under sec. 184, 68 Stat. 954, as amended (42 U.S.C. 2234). Appendix F also issued under sec. 187, 68 Stat. 955 (42 U.S.C. 2237).

2. In §50.8 paragraph (b) is revised to read as follows:

§50.8 Information collection requirements: OMB approval

* * * * *

(b) The approved information collection requirements contained in this part appear in §§50.30, 50.33, 50.33a, 50.34, 50.34a, 50.35, 50.36, 50.36a, 50.48, 50.49, 50.54, 50.55, 50.55a, 50.59, 50.60, 50.61, 50.63, 50.64, 50.65, 50.67, 50.71, 50.72, 50.75, 50.80, 50.82, 50.90, 50.91, and appendices A, B, E, G, H, I, J, K, M, N, O, Q, and R to this part.

3. A new § 50.67 is added to read as follows:

§ 50.67 Shutdown and Low-Power Operations.

(a) Applicability. This section applies to all holders of operating licenses for commercial nuclear power plants.

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

"Cold Shutdown" means that plant state in which the reactor is subcritical, $K_{\text{Effective}}$ is less than .99, the reactor coolant system temperature is less than or equal to 200 °F, and all reactor vessel head closure bolts are fully tensioned.

"Low Power Condition" means that the plant is operating with the reactor critical and the main generator isolated from the grid because the output breaker connecting the unit to the utility power grid is open.

"Midloop Operation" means that plant operational state in which the plant is in a shutdown condition, fissionable fuel assemblies are present within the reactor vessel, and the reactor coolant system (RCS) water level is below the top of the flow area of the hot legs at the junction with the reactor vessel.

"Outage Plan" means that written plan of activities to be conducted during a shutdown or low power condition.

"Refueling Condition" means that plant state in which the reactor is subcritical with fissionable fuel assemblies present within the reactor vessel, and one or more reactor vessel head closure bolts are less than fully tensioned.

"Shutdown Condition" means that plant state in which the reactor is subcritical with fissionable fuel assemblies present within the reactor vessel.

Technical Specifications, Administrative Controls, Limiting Conditions for Operation, and Surveillance Requirements are as defined in 10 CFR 50.36.

(c) General Requirements. All licensees must:

(1) Provide reasonable assurance that uncontrolled changes in reactivity, uncontrolled changes in reactor coolant inventory, and loss of subcooled state in the reactor coolant system when subcooled conditions are normally being maintained will not occur when the plant is in either a shutdown or low power condition.

(2) Assure that containment integrity is maintained or can be reestablished in a timely manner as needed to prevent releases in excess of the guidelines of 10 CFR part 100 when the plant is in a shutdown or low power condition.

(3)(i) Identify that equipment (including electric power and compressed air) necessary to:

(A) Make the reactor subcritical or critical in a controlled manner and maintain it subcritical in a shutdown condition,

(B) Maintain reactor coolant system inventory and capability to add makeup water to the reactor vessel,

(C) Remove decay heat from the reactor,

(D) Monitor water level in the reactor vessel, and

(E) Maintain or reestablish containment integrity when the plant is in a shutdown or low power condition;

(ii) Establish controls for the equipment identified in paragraph (c)(3)(i) of this section such that they will perform their safety function when the plant is in a shutdown or low power condition. The controls must reflect sufficient redundancy in systems, subsystems, components, and features to ensure that, for the onsite electric power system in operation (assuming offsite power is not available), safety functions can be accomplished, assuming a single failure, for all conditions except refueling operations (with water level above the reactor in excess of a lower limit established in applicable technical specifications or plant procedures); and

(iii) The controls required by paragraph (c)(3)(ii) of this section must be included in either:

(A) Technical specifications limiting conditions for operation and surveillance requirements in accordance with the requirements of 10 CFR 50.36(c)(2) and (3), or

(B) Plant procedures required by technical specifications administrative controls pursuant to 10 CFR 50.36(c)(5).

(4)(i) Prior to (and throughout the shutdown refueling outage as necessary to accommodate unforeseen contingencies) entering cold shutdown or a refueling condition, evaluate realistically available fire protection features and the outage plan for possible fires stemming from activities conducted during cold shutdown or refueling conditions, and determine realistically whether such fires could prevent accomplishment of normal decay heat removal capability during cold shutdown or refueling conditions. If the evaluation shows that such fires would prevent accomplishment of normal decay heat removal capability, the licensee must either:

(A) Take measures to prevent the loss of normal decay heat removal by such fires during cold shutdown or a refueling condition, or

(B) Have a contingency plan in place that will ensure an alternate decay heat removal capability exists and that will describe the general steps to connect the alternate decay heat removal system to the RCS. Plant staff must be trained in the implementation of the contingency plan.

(ii) Any departures from the outage plan during the shutdown or refueling outage shall be evaluated in the manner also described above and appropriate measures implemented.

(d) Requirements for licensees of PWRs.

All licensees of pressurized-water reactors must provide instrumentation for monitoring water level in the RCS during midloop operation. The accuracy of the instrumentation shall not be affected by changes in pressure in the RCS or connected systems. The installed instrumentation shall include visible and audible indications in the control room to alert operators before water level falls below a prescribed limit.

(e) Implementation.

(1) All licensees must comply with paragraph (c) of this section by no less than 6 months before the first refueling outage that starts either 12 months or more after the effective date of this section or 12 months or more after issuance of the Commission's regulatory guide giving details and examples of approaches to satisfy these requirements (whichever is later).

(2) If the licensee chooses to install or modify systems, structures, or components to comply with the requirements of paragraph (c) of this section, such hardware installation and/or modification must be completed by the end of the first refueling outage that starts either 12 months or more after the effective date of this section or 12 months or more after issuance of the Commission's regulatory guide giving details and examples of approaches to satisfy these requirements (whichever is later).

(3) All licensees must submit technical specifications required by paragraph (c)(3)(iii) within 6 months after issuance of the final regulatory guide providing guidance on compliance with the requirements of this section.

(4) All licensees of PWRs, except as noted in paragraph (e)(5) of this section, must comply with paragraph (d) of this section by the end of the first refueling outage that starts either 12 months or more after the effective date of this section or 12 months or more after issuance of the Commission regulatory guide giving details and examples of approaches to satisfy this requirement (whichever is later).

(5) The requirement in paragraph (e)(4) of this section does not apply to those plants that have completely defueled for final shutdown but still retain an operating license (i.e., those plants that are preparing for decommissioning).

Dated at Rockville, Maryland, this ____ day of _____, 1994.

For the Nuclear Regulatory Commission.

Samuel J. Chilk,
Secretary of the Commission.

U.S. NUCLEAR REGULATORY COMMISSION

Documents Containing Reporting or Recordkeeping Requirements
Office of Management and Budget (OMB) Review

AGENCY: U.S. Nuclear Regulatory Commission (NRC)

ACTION: Notice of the OMB review of information collection.

SUMMARY: The NRC has recently submitted to the OMB for review the following proposal for the collection of information under the provisions of the Paperwork Reduction Act of 1980 (44 U.S.C Chapter 35).

1. Type of submission, new, revision, or extension: Revision.
2. The title of the information collection: Proposed Rule, "10 CFR 50.67: Shutdown and Low-Power Operations for Nuclear Power Reactors."
3. The form number if applicable: Not applicable.
4. How often the collection is required: One time.
5. Who will be required to report: Commercial nuclear power plant licensees.

6. An estimate of the number of annual respondents: licensees of 74 nuclear power plant sites
7. An estimate of the total number of hours needed annually to complete the requirement: 232,360 (approximately 3160 hours of recordkeeping burden per site).
8. An indication of whether Section 3504(h), Pub.L. 96-511 applies: Applicable.
9. Abstract: Proposed 10 CFR 50.67 of NRC's regulations, "Shutdown and Low-Power Operations for Nuclear Power Reactors" would require power reactor licensees to implement safety improvements to resolve NRC concerns regarding shutdown and low-power operations. In part, licensees would be required to (1) establish controls in technical specifications limiting conditions for operation and surveillance requirements in accordance with the requirements of 10 CFR 50.36(c)(2) and (3), or plant procedures required by technical specifications administrative controls pursuant to 10 CFR 50.36(c)(5) for equipment which licensees identify as necessary to perform their safety function when plants are in a shutdown or low power condition; and (2) evaluate realistically the effects of fires stemming from activities conducted during cold shutdown or refueling conditions, determine whether such fires could prevent accomplishment of the normal decay heat

removal capability, and if so, either provide measures to prevent loss of normal decay heat removal or establish a contingency plan that will ensure an alternate decay heat removal capability exists. These reporting and recordkeeping requirements, in addition to other actions required by the proposed amendment to NRC's regulations, are intended to protect public health and safety from the risk of a core-melt accident.

Copies of the submittal may be inspected or obtained for a fee from the NRC Public Document Room, 2120 L Street, NW. (Lower Level), Washington, DC 20555-0001.

Comments and questions should be directed to the OMB reviewer:

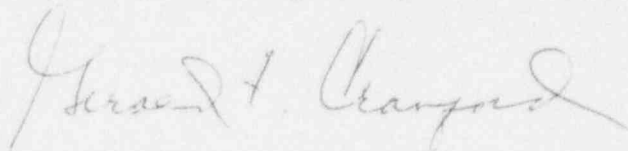
Troy Hillier
Office of Information and Regulatory Affairs (3150-0011)
NEOB-10202
Office of Management and Budget
Washington, DC 20503

Comments can also be submitted by telephone at (202) 395-3084.

The NRC Clearance Officer is Brenda Jo. Shelton, (301) 415-7233.

Dated at Rockville, Maryland, this *12th* day of *October* 1994.

For the Nuclear Regulatory Commission

A handwritten signature in cursive script, appearing to read "Gerald F. Cranford".

Gerald F. Cranford
Designated Senior Official for
Information Resources Management