
Regulatory Analysis of Proposed Rule, 10 CFR Parts 50, 52, and 73—Security Assessment Requirements for New Nuclear Power Reactor Designs

U.S. Nuclear Regulatory Commission

September 2006



Executive Summary

The Nuclear Regulatory Commission (NRC or Commission) is proposing to amend its regulations for new nuclear power reactors by adding security assessment requirements for applicants for a construction permit, operating license, standard design approval, design certification, manufacturing license, and combined license. The proposed amendments would require applicants to assess specific design features that would be incorporated into the facility and site design to support security effectiveness enhancements. The proposed amendments are needed to ensure that security design features are assessed early in the design and regulatory review process, and not later when it would be difficult to incorporate the features. Resolution of security design issues at the early stage of the regulatory review process would result in a more robust security posture requiring less reliance on operational security programs.

The analysis presented in this document examines the benefits and costs of the proposed security assessment requirements relative to the baseline of no existing security assessment requirements. The key findings of the analysis are as follows:

- **Total Cost to Industry**—The proposed rule would result in a total estimated cost to all applicants for a construction permit, operating license, design certification, manufacturing license, and combined license of \$9.16 million (using a 7-percent discount rate) or \$12.1 million (using a 3-percent discount rate) over the next 20 years.
- **Costs to the NRC**—The proposed rule would result in a total estimated cost to the NRC of \$2.14 million (using a 7-percent discount rate) or \$2.38 million (using a 3-percent discount rate) over the next 20 years.
- **Benefits**—The benefits of the proposed rule can only be evaluated on a qualitative basis. The analysis estimates that the proposed action would result in qualitative benefits in the following attributes—regulatory efficiency, public health (accidental), occupational health (accidental), off-site property, on-site property, and safeguards and security. The benefits are only expressed qualitatively and discussed in detail in Section 3.5.8 of this document.
- **Decision Rationale**—Although the NRC did not quantify the benefits of this rule, the NRC staff did qualitatively examine benefits and concluded that the rule would provide security-related benefits and believes that the rule is justified in terms of cost. The key benefit is enhanced regulatory efficiency through regulatory and compliance improvements, because applicants would assess security design features for new power reactors early in the regulatory review process. If nuclear power facility security is assessed late in the regulatory process, it would be more difficult to incorporate security design features into the facility or site design. Furthermore, resolution of security design issues at the early stage of the regulatory review process would result in a more robust security posture requiring less reliance on operational security programs.
- **Other Factors**—Enhancing the security design of the facility and site could also lead to improved public confidence. The NRC has concluded that the costs of the rule are justified in view of the qualitative benefits and recommends proceeding with the proposed rule.

Table of Contents

Executive Summary	i
1. Statement of the Problem and Objectives	1
1.1 Background	1
1.2 Objective of Proposed Rulemaking	1
1.3 Backfit Rule Concerns	2
2. Identification of Regulatory Alternatives	2
3. Analysis of Values and Impacts of Proposed Rulemaking	2
3.1 Identification of Affected Attributes	2
3.2 Analytical Methodology	3
3.3 Data	4
3.4 Assumptions	4
3.5 Analysis	4
3.5.1 Construction Permit Applications	5
3.5.2 Operating License Applications	5
3.5.3 Design Certification Applications	5
3.5.4 Manufacturing License Applications	6
3.5.5 Standard Design Approvals	6
3.5.6 Combined License Applications	7
3.5.7 NRC Implementation	8
3.5.8 Impacts to Other Stakeholders	11
3.5.9 Qualitative Benefits of the Proposed Action	11
4. Presentation of Results	11
5. Decision Rationale	12
6. Implementation	12

1. Statement of the Problem and Objective

1.1 Background

Since the events of September 11, 2001, the Nuclear Regulatory Commission (NRC or Commission) has assessed potential threats and their possible impacts to nuclear power reactors and has required upgrades of physical security measures at the Nation's fleet of operating power reactors. For new nuclear power reactors, the NRC staff concluded that a regulatory structure needed to be established for applicants for a construction permit, operating license, design certification, manufacturing license, or combined license to assess the design and incorporate specific security design features to support enhanced security effectiveness.

In 2003, the NRC staff proposed to the Commission various options for establishing security requirements for new power reactors and recommended requirements to incorporate security design and siting features at the design certification and combined license phases. The Commission responded by directing the staff to seek ways to codify security requirements related to the design basis threat as part of the licensing and design regulations applicable to future power reactor applications.

Subsequently, in SECY-05-0120, "Security Design Expectations for New Reactor Licensing Activities," dated July 6, 2005 (ADAMS Accession No. ML051100233), the NRC staff proposed to initiate rulemaking to Title 10, Part 50, "Domestic Licensing of Production and Utilization Facilities," of the *Code of Federal Regulations* (10 CFR Part 50) and 10 CFR Part 52, "Early Site Permits; Standard Design Certifications; and Combined Licenses for Nuclear Power Plants," requiring applicants for new reactor licensing activities to submit a security assessment and target set analysis. In response to SECY-05-0120, on September 9, 2005, the Commission issued a staff requirements memorandum (SRM) (ADAMS Accession No. ML052520334), directing the NRC staff, in part, to conduct a rulemaking to require new light water reactor applicants to submit a security assessment with their application.

The Commission is publishing this proposed rule as a supplement to the proposed rule, "Power Reactor Security Requirements," published on **September XX, 2006 (XX FR XXXX)** that would amend 10 CFR Part 73 by revising the current security regulations and adding new security requirements pertaining to existing and new nuclear power reactors. These requirements supplement the provisions of the "power reactor security requirements" rulemaking by requiring applicants for new nuclear power reactors to conduct a security assessment and include it with their application.

1.2 Objective of Proposed Rulemaking

The proposed rulemaking would amend the regulations in 10 CFR Parts 50 and 52, to require future applicants for a construction permit, operating license, standard design approval, design certification, manufacturing license, or combined license to submit a security assessment with their application. Furthermore, 10 CFR Part 73, "Physical Protection of Plants and Materials," would be amended to add the new 10 CFR 73.62, "Security Assessment for Nuclear Power Plants," to provide the requirements with which the security assessment must comply.

The proposed amendments would require applicants to assess specific design features that would be incorporated into the facility and site design to support security effectiveness enhancements. Resolution of security design issues at the early stage of the regulatory review process would result in a more robust security posture requiring less reliance on operational

security programs. If security is not assessed early in the regulatory review process, a specific security design feature would be more difficult to incorporate into the facility or site design. Ultimately, any security design issue identified by an assessment but not addressed by a security design feature at any application stage would be identified by a security assessment parameter and required to be addressed during the development of the operational security program under the provisions of 10 CFR Part 73.

1.3 Backfit Rule Concerns

The NRC has determined that the backfit rule does not apply to this proposed rule and, therefore, a backfit analysis is not required because the proposed rule does not contain any provisions that would impose backfitting as defined in the backfit rule, 10 CFR 50.109, "Backfitting." The proposed rule would revise the requirements for future standard design certifications, combined licenses, standard design approvals, manufacturing licenses, construction permits, and operating licenses for nuclear power facilities. These revisions would not constitute backfits because they are prospective in nature and the backfit rule was not intended to apply to every NRC action that substantially changes the expectations of future applicants. The proposed rule would impose no new requirements on (1) an applicant filing for a permit or license before the effective date of the final rule, (2) a design certification rule in Appendices A through D to 10 CFR Part 52, or (3) the current fleet of operating nuclear power reactors.

2. Identification of Regulatory Alternatives

The only alternative considered is to conduct a rulemaking to require applicants to submit a security assessment because the Commission has directed the NRC staff to revise the regulations in a staff requirements memorandum dated September 9, 2005. However, the NRC staff considers the no-action alternative as the baseline from which to measure the costs and benefits of the proposed rule.

The regulations in 10 CFR Parts 50 and 52 would be amended to require future applicants for a construction permit, operating license, design certification, manufacturing license, or combined license to submit a security assessment with their application. Furthermore, 10 CFR Part 73 would be amended to add the new 10 CFR 73.62 to provide the requirements with which the security assessment must comply. This rulemaking would provide a means of resolving security design issues at the early stage of the regulatory review process which would result in a more robust security posture requiring less reliance on operational security programs.

3. Analysis of Values and Impacts of Proposed Rulemaking

3.1 Identification of Affected Attributes

The attributes that the proposed rule could affect were identified by using the list of potential attributes provided in Chapter 5 of NUREG/BR-0184, "Regulatory Analysis Technical Evaluation Handbook," issued January 1997. Affected attributes include the following:

- Public Health (Accident)—The proposed action would reduce the risk that public health will be affected by radiological releases resulting from radiological sabotage.

- Occupational Health (Accident)—The proposed action would reduce the risk that occupational health will be affected by radiological releases resulting from radiological sabotage.
- Off-site Property —The proposed action would reduce the risk that off-site property will be affected by radiological releases resulting from radiological sabotage.
- On-site Property —The proposed action would reduce the risk that on-site property will be affected by radiological releases resulting from radiological sabotage.
- Industry Implementation —The proposed action would require applications for a construction permit, operating license, design certification, manufacturing license, or combined license to include a security assessment.
- NRC Implementation —Under the proposed action, the NRC would incur costs to develop guidance on conducting a security assessment and to review each assessment. The NRC would also incur the costs of completing this regulatory action.
- Regulatory Efficiency —The proposed action would result in enhanced regulatory efficiency through regulatory and compliance improvements by ensuring that security design features are assessed early in the regulatory review process, and not later, when it would be more difficult to incorporate the features. In addition, the proposed action would supplement the provisions of the “power reactor security requirements” rulemaking by requiring applicants for new nuclear power reactors to conduct a security assessment and include it with their application.
- Safeguards and Security Considerations —The proposed action is intended to establish requirements that would resolve security design issues at the early stage of the regulatory review process. This would result in a more robust security posture requiring less reliance on operational security programs.

This rulemaking would not result in any recurring costs to industry or the NRC.

3.2 Analytical Methodology

This section describes the process used to evaluate benefits and costs associated with the proposed action. The benefits (values) come from any desirable changes in the affected attributes (e.g., monetary savings, improved security resulting from new security assessment requirements) that are solely qualitative for the proposed action; while the costs (impacts or burdens) come from any undesirable changes in the affected attributes (e.g., monetary costs, increased exposures). As described in Section 3.1, the attributes expected to be affected include public health (accident), occupational health (accident), off-site property, on-site property, industry implementation, NRC implementation, regulatory efficiency, and safeguards and security considerations.

Ideally, a benefit-cost analysis quantifies the overall benefits and costs of the regulatory options relative to each of these attributes. This analysis relies on a qualitative evaluation of several of

the affected attributes (public health, occupational health, off-site property, on-site property, and safeguards and security considerations) because of the difficulty in quantifying the impact of the current rulemaking.¹ These attributes would be affected by the proposed action through the associated reduction in the risks of radiological sabotage damage to the reactor core and the spent fuel.

The remaining attributes (industry implementation and NRC implementation) are evaluated quantitatively. Quantitative analysis requires a characterization of the universe, including factors such as the number of applicants and the scope of the security assessment being performed. The incremental costs and benefits of the proposed regulatory action were analyzed relative to the baseline or the no-action alternative described in Section 2.

Under Office of Management and Budget guidance and NUREG/BR-0058, "Regulatory Analysis Guidelines of the U.S. Nuclear Regulatory Commission," Revision 4, issued September 2004, the results of the cost analysis are presented as discounted flows of funds using 3 and 7 percent real discount rates.

3.3 Data

Information on the number of applications submitted for a design certification, manufacturing license, or combined license under 10 CFR Part 52 has been derived from industry announcements. Given the uncertainty of the number of applications for a construction permit or operating license under 10 CFR Part 50, the NRC staff is using professional judgment in this analysis.

3.4 Assumptions

The proposed regulations would apply only to future applicants for a construction permit, operating license, standard design approval, design certification, manufacturing license, or combined license. They would not apply to (1) an application filed before the effective date of the final rule, (2) a design certification rule in Appendices A through D to 10 CFR Part 52, or (3) a licensee who currently operates a nuclear power reactor. A license application that incorporates by reference a construction permit, design certification, or manufacturing license, would not be required to address the design of the facility within the scope of the security assessment done for the referenced permit, certification, or license. If a license application references either a design certification or manufacturing license for which no security assessment was done for the facility design, then the license application would be required to include a complete security assessment, including what would otherwise have been performed at the design certification or manufacturing license stage (except if referencing Appendices A through D of 10 CFR Part 52).

3.5 Analysis

¹ The regulatory efficiency attribute also is evaluated qualitatively, by definition, in Section 5.5.1.4 of NUREG/BR-0184, Regulatory Analysis Technical Evaluation Handbook." Specifically, this attribute attempts to measure regulatory and compliance improvements resulting from the proposed action. These may include changes in industry reporting requirements and the NRC's inspection and review efforts. Achieving consistency with international standards groups may also improve regulatory efficiency for both the NRC and the groups. This attribute is qualitative in nature.

For the following first six subsections, the cost-benefit analysis of the proposed regulatory action is based upon NRC's assessment of the future business scenario for each category of applicant. In each case, only implementation costs would be incurred. Furthermore, because all of the benefits are measured qualitatively in this analysis, only costs are included in these subsections.

This analysis uses NRC and industry staff rates of \$88 and \$100 per hour, respectively. The annual results are derived as present values using the 3 and 7 percent discount rates as described in Appendix B of NUREG/BR-0184.

3.5.1 Construction Permit Applications

Although the NRC staff concludes that it is unlikely an applicant would utilize the 10 CFR Part 50 construction permit process, nonetheless, this analysis assumes that one application would be submitted to the NRC in the first year following promulgation of this rule. The NRC estimates that it would take a construction permit applicant 12 staff-months for a one-time cost of \$192,000 (12 staff-months x 4 weeks/month x 40 hours x \$100/hour) for completing the security assessment. The total industry cost is the present value of one application (at \$192,000 per application) or \$180,000 (using a 7-percent discount rate) and \$186,000 (using a 3-percent discount rate).

3.5.2 Operating License Applications

Although the NRC staff concludes that it is unlikely an applicant would utilize the 10 CFR Part 50 operating license process, nonetheless, this analysis assumes that one application would be submitted to the NRC in year 7 following promulgation of this rule. The NRC estimates that it would take an operating license applicant 12 staff-months for a one-time cost of \$192,000 (12 staff-months x 4 weeks/month x 40 hours x \$100/hour) for completing the security assessment. The total industry cost is the present value of one application (at \$192,000 per application) or \$120,000 (using a 7-percent discount rate) and \$156,000 (using a 3-percent discount rate).

3.5.3 Design Certification Applications

For the design certification process, this analysis assumes that three applications would be submitted to the NRC during the next 5 years (one application each at years 1, 3, and 5), and thereafter, one application each at years 8, 12, 16, and 20. The NRC estimates that it would take an applicant 12 staff-months for a one-time cost of \$192,000 (12 staff-months x 4 weeks/month x 40 hours x \$100/hour) per application for completing the security assessment. Following is a table showing the discounted flow of funds of the total industry implementation costs for design certification applications over 20 years.

Table 1. Summary of Industry Implementation Costs for Design Certification Applications			
Year	Number of Design Certification Applications	Implementation Costs	
		Using 7 Percent Discount Rate (\$1,000)	Using 3 Percent Discount Rate (\$1,000)
1	1	180	186
3	1	157	176
5	1	137	166
8	1	112	151
12	1	85	135
16	1	65	120
20	1	50	106
TOTAL	7	786	1,040

3.5.4 Manufacturing License Applications

Under the proposed action, a manufacturing license application that references a design certification for which a security assessment was performed would not be required to contain a security assessment. In this case, the security assessment would have been previously done by the applicant for the design certification. However, a manufacturing license application that proposes to use a custom design (i.e., not reference a design certification) or a design certification for which no security assessment was done, would be required to contain a security assessment for the facility design.

This analysis assumes that only two applications would be submitted to the NRC during the next 20 years; one application each at years 10 and 20. It is further assumed that the manufacturing license application submitted during year 10 references a design certification; therefore, the manufacturing license applicant would not be required to conduct a security assessment and no costs would be incurred. For the application submitted at year 20, it is assumed that a security assessment would be included because a custom design is proposed. The NRC estimates that it would take an applicant 12 staff-months for a one-time cost of \$192,000 (12 staff-months x 4 weeks/month x 40 hours x \$100/hour) per application for completing the security assessment. The total industry cost is the present value of one application in year 20, i.e., \$50,000 (using a 7-percent discount rate) and \$106,000 (using a 3-percent discount rate).

3.5.5 Standard Design Approvals

Under the proposed action, a standard design approval would be required to comply with the requirements for a security assessment in 10 CFR 73.62. However, the NRC staff concludes that it is unlikely that a request for a standard design would be submitted to the NRC for

approval during the next 20 years. Therefore, no cost-benefit analysis was done for a standard design approval.

3.5.6 Combined License Applications

For combined license applications, this analysis assumes that four applications would be submitted to the NRC per year during the next 5 years, and thereafter, 10 applications each at years 8, 12, 16, and 20. It is also assumed that all of the applications submitted during the next 5 years would propose to reference a design certification for which no security assessment was done. Furthermore, it is assumed that all of the applications at years 8 through 20 reference a design certification for which a security assessment was done, except for two applications each at years 12 and 16 that propose to use a custom design. Under the proposed action, a combined license application that proposes to use a custom design or references a design certification or manufacturing license for which no security assessment was done for the facility design, would also be required to include an assessment for the facility design.

The NRC estimates that it would take an applicant who references a design certification for which a security assessment was done 12 staff-months for a one-time cost of \$192,000 (12 staff-months x 4 weeks/month x 40 hours x \$100/hour) per application to complete a security assessment. Furthermore, it is estimated that it would take an applicant who proposes to use a custom design or references a design certification for which no security assessment was done, 18 staff-months for a one-time cost of \$288,000 (18 staff-months x 4 weeks/month x 40 hours x \$100/hour) per application to complete a security assessment. Following is a table showing the discounted flow of funds of the total industry implementation costs for combined license applications over 20 years.

Table 2. Summary of Industry Implementation Costs for Combined License Applications			
Year	Number of Combined License Applications	Implementation Costs	
		Using 7 Percent Discount Rate (\$1,000)	Using 3 Percent Discount Rate (\$1,000)
1	4*	1,077	1,119
2	4*	1,006	1,086
3	4*	940	1,054
4	4*	879	1,024
5	4*	821	994
8	10	1,117	1,515
12	2*	256	404
	8	682	1,077
16	2*	195	359
	8	521	957
20	10	495	1,064
TOTAL	60	7,989	10,653

* Combined license application proposes to use a custom design or references a design certification for which no security assessment was done.

3.5.7 NRC Implementation

Cost to Review the Security Assessments. The NRC would incur costs to review the security assessments included with each application. The one-time cost to review the security assessment for each application for a construction permit, operating license, design certification, manufacturing license (proposing to use a custom design), or combined license (referencing a design certification) is estimated to be \$14,000 (1 staff-month x 4 weeks/month x 40 hours x \$88/hour). For those cases in which a combined license application proposes to use a custom design or references a design certification for which no security assessment was done, the one-time cost to review each application is estimated to be \$28,000 (2 staff-months x 4 weeks/month x 40 hours x \$88/hour).

As an example, the total NRC cost for the first year of the implementation of the rule is the present value of the cost of reviewing six applications (one construction permit, one design certification, and four combined licenses that reference a design certification for which no security assessment was done; at \$140,000 for all six applications). This corresponds to a net present value of \$130,000 (using a 7-percent discount rate) and \$135,000 (using a 3-percent discount rate).

Cost to Develop Guidance. The estimated cost for NRC and contractor developed guidance to support implementation of the proposed action would be \$700,000.

Cost to Provide Training. The NRC would incur costs to develop a training course to provide training to NRC staff on the proposed changes to 10 CFR Parts 50, 52, and 73. Assuming that it would take 16 staff-hours to develop the training course, the cost is estimated to be \$1,400 (16 staff-hours x \$88/hour). The cost to train 20 people for 2 hours, plus the instructor's time of 2 hours is estimated to be \$3,700 (21 people x 2 hours x \$88/hour). The total cost to the NRC to provide training for the proposed action is estimated to be \$5,000.

Cost of the Regulatory Action. The NRC would incur 4.1 full-time equivalent (FTE) of staff time to complete this rulemaking after publishing the proposed rule. The cost for this action is estimated to be \$644,000 (4.1 FTE at \$157,000 per FTE).

Following is a table showing the discounted flow of funds of the total NRC implementation costs for the proposed action over 20 years.

Table 3. Summary of NRC Implementation Costs				
Year	Application		Implementation Costs	
	Number Reviewed	Category*	Using 7 Percent Discount Rate (\$1,000)	Using 3 Percent Discount Rate (\$1,000)
1	1 1 4	CP DC COL [†]	130	135
2	4	COL [†]	100	105
3	1 4	DC COL [†]	105	115
4	4	COL [†]	85	100
5	1 4	DC COL [†]	90	110
7	1	OL	10	10
8	1 10	DC COL	90	120
12	1 2 8	DC COL ^{††} COL	80	130
16	1 2 8	DC COL [†] COL	60	115
20	1 1 10	DC ML ^{††} COL	45	95
Cost to Review All Applications			795	1,035
Cost to Develop Guidance			700	700
Cost to Provide Training			5	5
Cost of the Regulatory Action			644	644
TOTAL NRC COSTS (rounded)			2,140	2,380

* CP = construction permit; OP = operating license; DC = design certification; ML = manufacturing license; and COL = combined license. NRC cost to review the assessment for each application category is about \$14,000.

[†] Combined license application references a design certification for which no security assessment was done. NRC cost to review the assessment is about \$28,000.

^{††} Combined license or manufacturing license application proposes to use a custom design. NRC cost to review the assessment is about \$28,000.

3.5.8 Impacts to Other Stakeholders

The NRC staff has not identified any impacts upon other stakeholders or the Agreement States. However, the proposed action could lead to an increase in public confidence because security design features would have been addressed and incorporated into the facility and site design at the early stage of the regulatory review process.

3.5.9 Qualitative Benefits of the Proposed Action

The benefits of the proposed rule can only be evaluated on a qualitative basis. The analysis estimates that the proposed action would result in qualitative benefits in regulatory efficiency, public health (accidental), occupational health (accidental), off-site property, on-site property, and safeguards and security.

Specifically, the benefits will include enhanced regulatory efficiency through regulatory and compliance improvements, because applicants would assess security design features for new power reactors early in the regulatory review process. If nuclear power facility security is assessed late in the regulatory process, it would be more difficult to incorporate security design features into the facility or site. Resolution of security design issues at the early stage of the regulatory review process would result in a more robust security posture requiring less reliance on operational security programs. In addition, the proposed rule would result in an increased level of assurance that nuclear power facilities can defend against the design basis threat. There would also be a reduced risk that public health and occupational health would be affected by radiological releases resulting from radiological sabotage. The proposed rule would also reduce the risk that off-site and on-site property will be affected by radiological releases resulting from radiological sabotage.

4. Presentation of Results

The results for the NRC cost-benefit analysis for industry are summarized in the following table.

Table 4. Summary of Total Industry Costs for Proposed Action		
Category of Application	Implementation Costs	
	Using 7 Percent Discount Rate (\$1,000)	Using 3 Percent Discount Rate (\$1,000)
Construction Permit	180	186
Operating License	156	120
Design Certification	786	1,040
Manufacturing License	50	106
Combined License	7,989	10,653
TOTAL (rounded)	9,160	12,100

The following table shows the total costs of the regulatory action.

Table 5. Summary of Industry and NRC Costs		
	Using 7 Percent Discount Rate (\$1,000)	Using 3 Percent Discount Rate (\$1,000)
Industry	9,160	12,100
NRC	2,140	2,380
TOTAL (rounded)	11,300	14,500

5. Decision Rationale

The total present-valued costs of this proposed action are \$11.3 million and 14.5 million for 7- and 3-percent discount rates, respectively. The benefits are only expressed qualitatively and discussed in detail in Section 3.5.9 of this document. As it noted the key benefit is enhanced regulatory efficiency through regulatory and compliance improvements, because applicants would assess security design features for new power reactors early in the regulatory review process. If nuclear power facility security is assessed late in the regulatory process, it would be more difficult to incorporate security design features into the facility or site design. The NRC has concluded that the costs of the rule are justified in view of the qualitative benefits and recommends proceeding with the proposed rule.

6. Implementation

The action would be enacted through a proposed rule, resolution of public comments, and a final rule, with promulgation of the final rule within 30 days from the date of publication. The NRC staff has not identified any impediments to implementing the recommended regulatory action.