Environmental Assessment Supporting Final Rule, 10 CFR Parts 50 and 52—Consideration of Aircraft Impacts for New Nuclear Power Reactors

U.S. Nuclear Regulatory Commission

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UNITED STATES NUCLEAR REGULATORY COMMISSION

ENVIRONMENTAL ASSESSMENT AND FINDING OF

NO SIGNIFICANT IMPACT

The Nuclear Regulatory Commission (NRC) is amending its regulations to require applicants for new nuclear power reactors to perform a design-specific assessment of the effects of the impact of a large, commercial aircraft. The requirements affected by this rulemaking include Title 10, Section 50.8, "Information Collection Requirements: Office of Management and Budget Approval," of the *Code of Federal Regulations* (10 CFR 50.8); 10 CFR 50.34, "Contents of Construction Permit and Operating License Applications; Technical Information"; 10 CFR 50.111, "Criminal Penalties"; 10 CFR 50.150, "Aircraft Impact Assessment"; 10 CFR 52.47, "Contents of Applications; Technical Information"; 10 CFR 52.59, "Criteria for Renewal"; 10 CFR 52.79, "Contents of Applications; Technical Information in Final Safety Analysis Report"; 10 CFR 52.137, "Contents of Applications; Technical Information"; and 10 CFR 52.157, "Contents of Applications; Technical Information in Final Safety Analysis Report."

The Commission believes that it is prudent for nuclear power plant designers to take into account the potential effects of the impact of a large, commercial aircraft. The Commission has determined that the impact of a large, commercial aircraft is a beyond-design-basis event, and the NRC's requirements that apply to the design, construction, testing, operation, and maintenance of design features and functional capabilities for design basis events will not apply to design features or functional capabilities selected by the applicant solely to meet the requirements of this final rule. The NRC's approach to aircraft impacts is consistent with its

previous approach to beyond-design-basis events. The objective of this rule is to require nuclear power plant[1] designers to perform a rigorous assessment of the design to identify design features and functional capabilities that could provide additional inherent protection to avoid or mitigate, to the extent practical and with reduced reliance on operator actions, the effects of an aircraft impact. This rule should result in new nuclear power reactor facilities being more inherently robust with regard to an aircraft impact than if they were designed in the absence of this final rule. This final rule provides an enhanced level of protection beyond that which is provided by the existing adequate protection requirements, which all operating power reactors are required to meet.

The final rule requirements to perform an aircraft impact assessment apply to applicants for the following: new construction permits; new operating licenses that reference a new construction permit; new standard design certifications; new standard design approvals; combined licenses that do not reference a standard design certification, standard design approval, or manufactured reactor; and manufacturing licenses that do not reference a standard design certification or standard design approval. In addition, the requirements apply to the four existing design certifications in 10 CFR Part 52, Appendices A through D, but only if they are referenced in a combined license. These applicants are required to perform an assessment of the effects on the designed facility of the impact of a large, commercial aircraft. Applicants must identify and incorporate into the design those practical design features and functional capabilities that avoid or mitigate the effects of an aircraft impact, addressing core cooling

[1] The requirements of the final aircraft impact rule may apply, in some contexts, to the designer who is responsible for, or seeks certification or regulatory approval of something less than a complete nuclear power plant, *e.g.*, a nuclear reactor without site-specific elements such as the ultimate heat sink. For ease of discussion in the remainder of this environmental assessment, reference to a “nuclear power plant designer” or “facility designer” is meant to include, in the appropriate context, a designer of something less than a complete nuclear power plant, but is at least as encompassing as a “nuclear reactor.” Similarly, a reference to the design of a “facility” also encompasses, in the appropriate context, the design of something less than a complete nuclear power plant, *e.g.*, the design of a reactor.

capability, containment integrity, spent fuel cooling capability, and spent fuel pool integrity. Applicants are required to describe how such design features and functional capabilities avoid or mitigate, to the extent practical and with reduced reliance on operator actions, the effects of an aircraft impact.

The Commission-approved design basis threat (DBT) does not include an aircraft attack. The NRC published its final DBT rule in the *Federal Register* on March 19, 2007 (72 FR 12705) (10 CFR 73.1, "Purpose and Scope). Two well-established bases support the exclusion of aircraft attacks from the DBT. First, it is not reasonable to expect a licensee with a private security force using weapons legally available to it to be able to defend against such an attack. Second, such an act is in the nature of an attack by an enemy of the United States (U.S.). Power reactor licensees are not required to design their facilities or otherwise provide measures to defend against such an attack, as provided by 10 CFR 50.13, "Attacks and Destructive Acts by Enemies of the United States; and Defense Activities."

The current requirements, in conjunction with the currently proposed revisions to 10 CFR 50.54 to address loss of large areas of the plant due to explosions or fires (73 FR 19443), will continue to provide adequate protection of the public health and safety and the common defense and security. Nevertheless, the Commission has decided to also require applicants for new nuclear power reactors to incorporate into their design additional practical features that would avoid or mitigate the effects of an aircraft impact. This final rule to address the capability of new nuclear power reactors relative to an aircraft impact is based both on enhanced public health and safety and enhanced common defense and security, but is not necessary for adequate protection. Rather, this rule's goal is to enhance the facility's inherent robustness at the design stage.

Requiring applicants for new nuclear power reactors to perform a rigorous aircraft impact assessment and identify and incorporate into their design those design features and functional capabilities that address the effects of a beyond-design-basis aircraft impact is consistent with the NRC's historic approach to beyond-design-basis events and with the NRC's position in its "Policy Statement on Severe Reactor Accidents Regarding Future Designs and Existing Plants" (50 FR 32138; August 8, 1985). The policy statement notes, "The Commission expects that vendors engaged in designing new standard [or custom] plants will achieve a higher standard of severe accident safety performance than their prior designs." The NRC reiterated that regulatory approach in its "Policy Statement on the Regulation of Advanced Nuclear Power Plants," (59 FR 35461, July 12, 1994), when it stated, "The Commission expects that advanced reactors would provide enhanced margins of safety and/or utilize simplified, inherent, passive, or other innovative means to accomplish their safety functions." This regulatory approach has demonstrated its success, as all designs subsequently submitted to and certified by the Commission represent substantial improvement in safety for operational events and accidents. The final aircraft impact rule will further increase the safety of new nuclear power plants for aircraft impacts and is consistent with these policy statements.

This new aircraft impact assessment rule complements the proposed revisions to 10 CFR 50.54(hh) to mitigate the effects of large fires and explosions. The proposed 10 CFR 50.54(hh) provisions on mitigating large fires and explosions would codify the adequate protection requirement imposed on existing operating reactors by Interim Compensatory Measures (ICM) Order, Item B.5.b. The provisions of 10 CFR 50.54(hh), therefore, are necessary for adequate protection and must remain in regulations that are applicable to all currently operating reactors and must be satisfied by all newly licensed power reactors. Current reactor licensees have already developed and implemented procedures that would comply with

these proposed 10 CFR 50.54(hh) requirements, and would not require any additional action to comply with these proposed rule provisions. New applicants for and new holders of operating licenses under 10 CFR Part 50 and combined licenses under 10 CFR Part 52 would be required to develop and implement procedures that would employ mitigating strategies similar to those now employed by current licensees to maintain or restore core cooling, containment, and spent fuel pool cooling capabilities under the circumstances associated with loss of large areas of the plant due to explosions or fire. The requirements described in proposed 10 CFR 50.54(hh) relate to the development of procedures for addressing certain events that are the cause of large fires and explosions that affect a substantial portion of the nuclear power plant, and are not limited or directly linked to an aircraft impact. The rule contemplates that the initiating event for such large fires and explosions could be any number of DBT or beyond-DBT events. In addition, the NRC regards proposed 10 CFR 50.54(hh) as necessary for reasonable assurance of adequate protection to public health and safety and common defense and security. This is consistent with the NRC's designation of the orders on which proposed 10 CFR 50.54(hh) is based as being necessary for reasonable assurance of adequate protection.

In contrast to the adequate protection requirements of proposed 10 CFR 50.54(hh), this aircraft impact final rule will enhance safety and security by requiring an assessment of newly designed facilities to avoid or mitigate the effects of aircraft impacts. New nuclear power reactor applicants will be subject to both the requirements of the aircraft impact rule and the proposed requirements in 10 CFR 50.54(hh). The overall objective of these rules is to enhance a nuclear power plant's capabilities to withstand the effects of a large fire or explosion, whether caused by an aircraft impact or other event, from the standpoints of both design and operation. The impact of a large, commercial aircraft on the nuclear power plant is regarded as a beyond-design-basis event. In light of the NRC's view that effective mitigation of the effects of events causing large

fires and explosions (including the impact of a large, commercial aircraft) can be provided through operational actions, the NRC believes that the mitigation of the effects of aircraft impacts through design should be regarded as a safety enhancement which is not necessary for adequate protection. Therefore, the aircraft impact rule – unlike the proposed 10 CFR 50.54(hh) – is regarded as a safety enhancement, which is not necessary for adequate protection.

The NRC regards the aircraft impact and 10 CFR Part 50.54(hh) rulemakings to be complementary in scope and objectives. The aircraft impact rule focuses on enhancing the design of future nuclear power plants to withstand large, commercial aircraft impacts, with reduced reliance on operator actions. Proposed 10 CFR 50.54(hh) focuses on ensuring that the nuclear power plant's licensees will be able to implement effective mitigation measures for large fires and explosions, including (but not explicitly limited to) those caused by the impact of a large, commercial aircraft.

The NRC's determination that the impact of a large commercial aircraft at a nuclear power plant is a beyond design basis event is consistent with the NRC's consideration in the mid-1980's of potential new rules addressing accidents more severe than design basis accidents. The 1985 "Policy Statement on Severe Reactor Accidents" explained the Commission's conclusion that, although it was proposing criteria to show new reactor designs to be acceptable for severe accident concerns, then-existing plants posed no undue risk to public health and safety, and thus, there was no need for action on operating reactors based on severe accident risks. The Commission's reasoning in the severe accident context continues to be applicable, and supports the NRC's conclusion in this final rulemaking that although new power reactors should be assessed for aircraft impacts and designed to avoid or mitigate the effects of an aircraft impact, existing reactors and designs provide adequate protection of the public health and safety and common defense and security.

ENVIRONMENTAL ASSESSMENT

Identification of the Action:

The objective of this rulemaking is to require applicants for new nuclear power reactors to perform a design-specific assessment of the effects of the impact of a large, commercial aircraft. The applicant is required to identify and incorporate into the design those design features and functional capabilities that avoid or mitigate, to the extent practical and with reduced reliance on operator actions, the effects of the aircraft impact on core cooling capability, containment integrity, spent fuel cooling capability, and spent fuel pool integrity. In addition, these amendments contain requirements for control of changes to any design features or functional capabilities credited for avoiding or mitigating the effects of an aircraft impact. These requirements apply to applicants for and holders of new construction permits; applicants for and holders of new operating licenses that reference a new construction permit; applicants for new standard design certifications; applicants for new standard design approvals; applicants for and holders of combined licenses; and applicants for and holders of manufacturing licenses. In addition, the requirements apply to the four existing design certifications in 10 CFR Part 52, Appendices A through D, but only if they are referenced in a combined license. The final aircraft impact rule, by ensuring that all design certifications referenced in a combined license comply with the aircraft rule, effectively ensures that the design of every combined license complies with the final rule. This rule should result in new nuclear power reactor facilities being more inherently robust with regard to an aircraft impact than if they were designed in the absence of this final rule. This final rule provides an enhanced level of protection beyond that which is provided by the existing adequate protection requirements, which all operating power reactors are required to meet.

The approach proposed in this rulemaking will maintain a level of specificity in 10 CFR Part 50 and 10 CFR Part 52 that is comparable to the current regulations, while revising requirements to be consistent with Commission direction to require applicants for new nuclear power reactors to perform a design-specific assessment of the effects of the impact of a large, commercial aircraft.

The Need for the Action:

The purpose of this action is to implement a regulatory process to require nuclear power plant designers to perform a rigorous assessment of the design of the facility to identify and incorporate into the design those design features and functional capabilities that could provide additional inherent protection to avoid or mitigate, to the extent practical and with reduced reliance on operator actions, the effects of an aircraft impact.

Environmental Impacts of the Final Action:

The NRC has concluded that there will be no significant adverse radiological environmental impacts associated with implementation of the final rule. The rule essentially will result in all newly designed and constructed nuclear power plants using designs that have been assessed to determine the effects of the impact of a large commercial aircraft, and to have design features and functional capabilities to address such impacts to the extent required by the rule. The impact of a large, commercial aircraft is a beyond-design-basis event. Thus, the final rule will not require changes to the design basis functional requirements for the facility's structures, systems, and components that function to limit the release of radiological effluents during and following postulated accidents. As a result, all of the structures, systems, and components associated with limiting the releases of offsite radiological effluents will continue to

be able to perform their functions; consequently, there will be no significant radiological effluent impact. The NRC also notes that, to the extent that that the rule results in the incorporation of such design features and functional capabilities into the design of nuclear power plants, there is the potential for a decrease in radiological consequences attributable to the beyond design basis event of an aircraft impact. While this is not the primary basis for the NRC's determination on the lack of environmental impact attributable to the final aircraft impact rule, it does provide additional context for the NRC's determination in this regard.

In addition, the standards and requirements applicable to radiological releases and effluents are not affected by this rulemaking and continue to apply to the nuclear power reactors affected by this rulemaking. Implementation of the final rule will not result in impacts to a facility related to normal operation and any associated releases.

Therefore, this action will not significantly increase the probability or consequences of accidents, nor result in changes in the types of any effluents that may be released offsite, and will not result in a significant increase in occupational or public radiation exposure.

Alternatives to the Action:

As an alternative to the rulemaking described above, the NRC considered not taking the action (i.e., the "no-action" alternative). Not revising the regulations for applicants for new nuclear power reactors would result in no change in current environmental impacts since these requirements have no environmental impact and taking no action therefore results in no net change to the environment. However, the no-action alternative would not change the governing regulations for these applicants and the regulations will not reflect the need for nuclear power plant designers to perform a rigorous assessment of the design of the facility to identify and incorporate into the design those design features and functional capabilities that could provide

additional inherent protection to avoid or mitigate, to the extent practical and with reduced reliance on operator actions, the effects of an aircraft impact. The NRC has concluded that requiring applicants for new nuclear power reactors to perform an aircraft impact assessment is a desirable regulatory outcome, and has rejected the no-action alternative.

Alternative Use of Resources:

This action does not involve the use of any resources not previously considered by the NRC in its past environmental statements for issuance of standard design certifications, construction permits, operating licenses, combined licenses, and manufacturing licenses for nuclear power reactors.

Agencies and Persons Consulted:

The NRC developed the final rule and this environmental assessment. In accordance with its stated policy, the NRC provided a copy of the proposed rule to designated liaison officials for each State. No other agencies were consulted.

FINDING OF NO SIGNIFICANT IMPACT

On the basis of the environmental assessment, the NRC concludes that the action will not have a significant effect on the quality of the human environment. Accordingly, the NRC has determined not to prepare an environmental impact statement for the action.

Documents may be examined and/or copied for a fee, at the NRC's Public Document Room, located at One White Flint North, 11555 Rockville Pike (first floor), Rockville, Maryland 20852. Publicly available records will be accessible electronically from the Agencywide

Documents Access and Management System Public Library component on the NRC Web site at http://www.nrc.gov (Electronic Reading Room).

Dated at Rockville, Maryland, this 26 day of September 2008.

FOR THE NUCLEAR REGULATORY COMMISSION

/RA/

Michael J. Case, Director
Division of Policy and Rulemaking
Office of Nuclear Reactor Regulation