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RULEMAKINGS AND
ADJUDICATIONS STAFF

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VIA MAIL & EMAIL

December 17, 2007

Ms. Annette Vietti-Cook
Office of the Secretary
U.S. Nuclear Regulatory Commission
Washington, DC 20555-0111
Attention: Rulemaking and Adjudications Staff

By email: SECY@nrc.gov

Re: Comments of NC WARN on Proposed Aircraft Rule

Dear Ms. Vietti-Cook:

In addition to the attached comments, NC Waste Awareness and Reduction Network ("NC WARN") endorses, adopts and incorporates the submitted comments of Beyond Nuclear, the Union of Concerned Scientists and Greenpeace USA on this proposed rulemaking.

Sincerely,

John D. Runkle
Counsel for NC WARN

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SECY-02

NC WARN COMMENTS ON PROPOSED NRC AIRCRAFT RULE

NRC regulations for implementation of the Atomic Energy Act provide that a nuclear power plant must be designed against accidents that are "anticipated during the life of the facility." 10 C.F.R. § 50.34(a)(4) provides that a construction permit application for a nuclear power plant must include:

> a preliminary analysis and evaluation of the design and performance of structures, systems, and components of the facility with the objective of assessing the risk to public health and safety resulting from operation of the facility and including determination of the margins of safety during normal operations and transient conditions anticipated during the life of the facility, and the adequacy of structures, systems, and components provided for the prevention of accidents and the mitigation of the consequences of accidents.

The NRC relies in large part on the "adequacy of structures, systems and components" to prevent and mitigate the "anticipated" accidents, i.e., the "design-basis accidents."[1] Design-basis accidents include low-frequency but credible events. The applicant for a license renewal and the resulting Environmental Impact Statement ("EIS") prepared by the NRC must analyze and evaluate the adequacy of the plant to protect the public health and safety from these accidents.

The NRC designates accidents that are more complex and less likely than design basis accidents as "severe accidents." The License Renewal GEIS at page 5-1 states that severe accidents are "those involving multiple failures of equipment or function and, therefore, whose likelihood is generally lower than design-basis accidents but whose consequences may be higher." Although severe accidents are "beyond the substantial coverage of design-basis events," they constitute "the major risk to the public associated with radioactive releases from nuclear power plant accidents."[2]

The goal of the EIS is to analyze and evaluate the ability of the plant to operate safely; first that the plant is in compliance with safety rules, and protected against "anticipated" accidents and design basis accidents, and the "reasonably foreseeable" impacts which have "catastrophic consequences, even if their probability of occurrence is low." 40 C.F.R. § 1502.22(b)(1). In licensing hearings, the Commission has required that the EIS address the probability of severe accidents and how to prevent them if at all

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[1] NUREG-1437, Generic Environmental Impact Statement for License Renewal of Nuclear Plants at 5-1 (1996) ("License Renewal GEIS").

[2] "Policy Statement on Severe Accidents Regarding Future Designs and Existing Plants," 50 Fed. Reg. 32,138, 32,139 (August 8, 1985) ("Severe Accident Policy Statement").

possible, or mitigate them if they cannot be prevented. See, e.g., *Carolina Power & Light Co.* (Shearon Harris Nuclear Power Plant), CLI-01-11, 53 NRC 370, 387 (2001).

Significant new information, including the attacks of September 11, 2001, and the NRC's response to those attacks, shows that the environmental impacts of intentional destructive acts against nuclear plants are reasonably foreseeable. Additionally, a recent decision in the U.S. Supreme Court, arising from a case in the Federal 9th Circuit, declared that the NRC is required to consider the environmental impacts of intentional attacks on the proposed dry cask storage installation at Diablo Canyon Plant. *San Luis Obispo Mothers for Peace v. NRC*, 449 F.3d 1016 (9th Cir. 2006), cert. den. 549 US ___ (06-466, January 16, 2007). It is clear that deliberate malicious actions must be considered by the NRC in rules affecting licensing decisions. It is further clear that given the state of world affairs, aviation attacks are design basis threats that must be addressed.

In our limited review, it appears that none of the licensing documents for any of the existing nuclear power plants evaluated the consequences of an aircraft attack and the resulting impact, penetration, explosion and fire. The potential for accidents caused by deliberate malicious actions and the resulting equipment failures is not only reasonably foreseeable, but is likely enough to qualify as a "design-basis accident," i.e., an accident that must be designed against under NRC safety regulations. The NRC has been aware of this risk of aircraft attacks for at least 25 years and has not taken any significant safety-related actions to prevent or mitigate them.

In its 1982 analysis, the Argonne National Laboratory submitted its "Evaluation of Aircraft Hazards Analysis for Nuclear Power Plants," NUREG-2859, to the NRC.[3] This study focused on accidental aircraft crashes but the same threat analysis can and should be made for the impacts of deliberate malicious actions at the SHNPP. NUREG 2859 at page 5 identifies that:

> The major threats associated with an aircraft crash are the impact loads resulting from the collision of the aircraft with power plant structures and components and the thermal and/or overpressure effects which can arise due to the ignition of the fuel carried by the aircraft.

Page 11 continues that:

> It appears that for all U.S. plants currently under construction it has been found that it is not necessary to require containments designed to take the impact of a large commercial jet aircraft. This practice is contrasted by the experience in the Federal Republic of Germany where it has been found

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[3] It is our understanding that NUREG-2859 is attached to the comments of Beyond Nuclear in this rulemaking docket. We adopt it by reference herein.

> necessary to design essentially all nuclear containments to withstand the crash of certain types of military and commercial aircraft.

NUREG-2859 continues on page 42 that:

> Niyogi et al ... numerically weight the effective areas of their identified susceptible targets by assumed conditional release probabilities as follows: a value of 1.0 for the containment, fuel storage building, and control room; 0.1 for the primary auxiliary building and equipment vault; 0.01 for the diesel generator building, cooling tower, and waste-processing building, refueling water storage tank, circulating water pump house, and service water pump house; and 0.0 for the turbine building.

NUREG-2859 continues on p. 50 with the following

> The results of an aircraft crash on a nuclear power plant are not limited to the effects of the impact of heavy parts (such as a jet engine) on civil engineering structures. Numerous systems are required in order to provide reactor shutdown and adequate long-term cooling of the core. Although many of these safety-related systems are well protected within hardened structures (containment system, auxiliary building), some are not.

As described above, the various structures, systems and components of the plant cannot be relied upon if the plant is not in compliance with safety-related rules, such as the 10 C.F.R. 50, Appendix R, Section III.G.2 regulations for fire protection, that leave all of the post-fire safe shutdown systems vulnerable. The impacts of an aircraft attack greatly compound any current problems that the nuclear plants may have in fire protection making the impact devastating. NUREG-2859 states on pages 76 - 77 that "[i]f only one percent of the fuel, say 500 lb. for the FB-111 fighter plane, is involved in such an event, the blast environment will be equivalent to the detonation of approximately 1000 lb. of TNT." NUREG-2859 continues on page 78 that

> Based on the review of past licensing experience, it appears that fire and explosion hazards have been treated with less care than the direct aircraft impact and the resulting structural response. Therefore, the claim that these fire/explosion effects do not represent a threat to nuclear power plant facilities has not been clearly demonstrated.

Given accidents at various nuclear plants, such as San Onofre, Rancho Seco, and Crystal River facilities, it is clear that electrical failures lead to the inability for safe shutdown. NUREG-2859 continues at Page 51 through 53:

> A crash of an aircraft on a switchyard would very likely eliminate the plant's offsite power. Furthermore, although there exist protective design features against propagation of electrical failures from the switchyard into the rest of the plant, the probability for such electrical failure propagation is not zero: Past experience has shown that the electrical failures may propagate unexpectedly from nonsafety systems to safety systems . . . An aircraft crash on a PWR nuclear power plant resulting in rapid depressurization of the plant's secondary cooling system, combined with total loss of electrical power (impact on the turbine building and the switchyard), would result in an accident sequence in which the fission power in the core would remain at some considerable level: Initially, upon dropping of the control rods, the fission power would decrease; however, the rapid depressurization of the secondary system would result in a rapid cooldown of the primary system, thus resulting in recriticality; since the primary system would remain pressurized (preventing discharge of the accumulators with borated water), and since the safety injection system (SIS) would not be functioning due to loss of electric power, there would be no way to shut down the reactor. Furthermore, since the loss of electrical power and the damage to the secondary system would preclude any cooling other than short-term boil-off of the primary coolant inventory, the core would most probably be headed for serious damage if not total meltdown. Core meltdown, without the availability of electric power, would probably result in containment overpressurization and release of radioactive materials to the environment far in excess of 10 C.F.R. 100 guidelines. Note that the above sequence of events does not depend in any way on the breach of a hardened structure due to the impact of a heavy segment of the aircraft at some optimum (i.e., most damaging) angle, which seems up to now to have had the greatest attention in the evaluation of nuclear power reactor safety with respect to aircraft crashes . . . An aircraft crash affecting the ultimate heat sink (cooling tower, water intakes, etc.) would leave core cooling dependent on the feed-and-bleed cooling mode, provided a sufficient water supply and electrical power remain available.

Compared to other causes of accidents, aircraft attacks are some of the most severe. NUREG-2859 states on page 70 that "[o]n the other hand, the effect due to the impact of the Boeing 707-320 at 103 m/s is clearly more severe than that due to an earthquake." On page 79, NUREG-2859 concludes with:

> Major criticisms that may be made of typical aircraft hazards analyses are the lack of clear and supported statements on many key underlying assumptions and comprehensive treatments of the overall hazard. Thus, both the open literature and documentation concerning specific power plants abound with studies of the impact phenomena of aircraft or aircraft

> missiles on substantial concrete structures. These analyses are pursued to the virtual exclusion of other aircraft crash scenarios. ... It is possible to envision a chain of events that involves nonhardened plant systems, e.g., a switchyard-turbine hall, which could lead to severe consequences.

These same concerns about the inadequacy of nuclear plants to withstand aircraft accidents and attacks were raised in at least two more recent studies. In March 2000, the NRC requested that the Turkey Point nuclear plant respond to agency questions about the expanded aircraft operations at the nearby Homestead Air Force Base. In the response, the owner of the plant informed that a number of postulated aircraft impacts would lead to fuel damage, i.e., conditional core damage probability, and core failure.[4] In October 2000, the NRC released a study of the spent fuel pool hazard at nuclear power plants undergoing decommissioning.[5] That study determined that the impacts of an aircraft attack were possible, and the results devastating.

In response to a rulemaking petition to amend 10 C.F.R. § 73.1 and to fulfill its Congressional mandate under Section 651 of the Energy Policy Act of 2005, the NRC initiated and completed a review of its Design Basis Threats.[6] On January 29, 2007, the NRC voted to revise its security regulations and adopt the modifications. The purpose of the rulemaking was to see if the nuclear plants were safe from attacks because "the need for enhancement was recognized due to the escalation of domestic threat levels." The NRC did not address active protection measures against aircraft attacks as it considered the "passive measures already in place . . . are appropriate for protecting nuclear facilities from an aerial attack."[7]

A key premise in the modified security rules is the NRC's belief that the nuclear plants need to rely primarily on "passive measures" in the regulatory requirements to mitigate fires and explosions. As part of the release of this rulemaking, NRC Chairman Dale Klein stated that

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[4] Letter from R.J. Hovey, Vice President – Turkey Point Plant to NRC, "Response to Request for information Regarding the Potential Rick of the Proposed Civil and Government Aircraft Operation at Homestead Air Force Base on the Turkey Point Plant," May 2, 2000.

[5] NRC, "Technical Study of Spent Fuel Pool Accident Risk at Decommissioning Nuclear Power Plants," October 2000.

[6] "Final Rulemaking to Revise 10 C.F.R. 73.1, Design Basis Threat (DBT) Requirements," SECY-06-0219, October 30, 2006.

[7] *Ibid.*, page 4.

> Nuclear power plants are inherently robust structures that our studies show provide adequate protection in a hypothetical attack by an airplane. The NRC has also taken actions that require nuclear power plant operators to be able to manage large fires or explosions - no matter what caused them.

These assertions by Chairman Klein are contrary to the findings in a long series of studies on security issues that have been undertaken by the NRC beginning NUREG-2859 in 1982, that show that the plants cannot withstand an aerial attack.[8] Nothing has been demonstrated by the NRC that any of the nuclear plants are "inherently robust" enough to withstand an aircraft attack.

In light of the above, the NRC must promulgate rules that deal directly with aircraft attacks. Existing plants should be retrofitted against these reasonably foreseeable threats to prevent or mitigate all reasonably foreseeable damages. All new plants should have a wide variety of safety features to prevent or mitigate damages incorporated into their design prior to being licensed.

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[8] Union of Concerned Scientists Issue Brief: THE NRC'S REVISED SECURITY REGULATIONS, February 1, 2007; www.ucsusa.org/assets/documents/clean_energy/20070201-ucs-aircraft-fire-hazards.pdf. Adopted herein by reference.

From: "John Runkle" <jrunkle@pricecreek.com>
To: <SECY@nrc.gov>
Date: Mon, Dec 17, 2007 10:03 AM
Subject: Comments on proposed aircraft rules

VIA MAIL & EMAIL

ATTENTION: Rulemaking and Adjudications Staff

Attached please find the comments of the NC Waste Awareness and Reduction Network on the proposed aircraft rules. Please inform me of any action the NRC makes regarding this rulemaking.

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