



Union of Concerned Scientists

Citizens and Scientists for Environmental Solutions

DOCKETED
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December 17, 2007 (10:00am)

OFFICE OF SECRETARY
RULEMAKINGS AND
ADJUDICATIONS STAFF

December 14, 2007

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Annette Vietti-Cook, Secretary
U.S. Nuclear Regulatory Commission
Washington, DC 20555-0001

Attention: Rulemakings and Adjudications Staff

SUBJECT: COMMENTS ON NRC PROPOSED RULE "CONSIDERATION OF AIRCRAFT IMPACTS FOR NEW NUCLEAR POWER REACTOR DESIGNS" (RIN 3150-AI19)

Dear Ms. Vietti-Cook:

Pursuant to the notice published in the *Federal Register* (Vol. 72, No. 191, October 3, 2007, pp. 56287-56308), we submit the attached comments on the subject proposed rule on behalf of the Union of Concerned Scientists and the following individuals/organizations:

Paul Gunter
Beyond Nuclear
Takoma Park, MD

Rochelle Becker
Alliance for Nuclear Responsibility
San Luis Obispo, CA

Jim Warren
North Carolina Waste Awareness and Reduction Network
Durham, NC

Tom "Smitty" Smith
Public Citizen
Austin, TX

Karen Hadden
SEED Coalition
Austin, TX

Sincerely,

David Lochbaum
Director, Nuclear Safety Project

Edwin S. Lyman, Phd
Senior Scientist



Union of Concerned Scientists

Citizens and Scientists for Environmental Solutions

Comments on Proposed Rule: Consideration of Aircraft Impacts for New Power Reactor Designs

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<p>(1)</p>	<p>On page 56287 column 2, the published notice stated: “<i>Comments on rulemakings submitting in writing or in electronic form will be made available to the public in their entirety on the NRC rulemaking Web site.</i>”</p> <p>By letter dated May 1, 2007, NRC Chairman Dale Klein updated Congressman Bart Gordon, Chairman of the House Committee on Science and Technology, regarding documents contained in former NRC local public document rooms (LPDRs). Chairman Klein informed Chairman Gordon that the NRC had determined not to take any steps to further review or control the LPDR documents. Quoting from Chairman Klein’s letter:</p> <p style="text-align: center;"><i>The determination was and continues to be based in part on the fact that the level of sensitivity of the documents at issue is below that of Classified or Safeguards Information and on the belief that the information is of marginal value to potential adversaries.</i></p> <p>We have attached to our comments documents we obtained from the former LPDR collection UCS obtained in summer 2006 because the information in these non-Classified, non-Safeguards Information documents, while “<i>of marginal value to potential adversaries,</i>” contains information of considerable value to our positions. We respectfully insist the NRC abide by its stated plan of making our comments, including these attachments, publicly available “in their entirety.”</p>
<p>(2)</p>	<p>The NRC seems intent on repeating the wrong steps that led to the Davis-Besse debacle. In spring 2001, the NRC became aware of cracking and leaking control rod drive mechanism (CRDM) nozzles at the Oconee nuclear plant. The NRC issued a bulletin in August 2001 requiring owners of other nuclear plants to inspect the CRDM nozzles. The most vulnerable plants were required to inspect the CRDM nozzles by the end of 2001. When Davis-Besse balked at conducting the required inspections, the NRC drafted an order that would have required its owner to shut down Davis-Besse by December 31, 2001. Because that date had been selected arbitrarily, Davis-Besse’s owner challenged that aspect and argued that the NRC should allow the reactor to operate until its refueling outage scheduled in spring 2002. The NRC bent to this pressure and shelved the shut down order.</p> <p>Now, the NRC seems destined to repeat this mistake. On page 56290, the NRC arbitrarily proposes to exempt certified but unbuilt new reactor designs from considering aircraft impact hazards. This proposed exemption both contradicts and undermines the objective stated by the NRC on page 56288:</p> <p style="text-align: center;"><i>The overriding objective of this rule is to require nuclear power plant designers to perform a rigorous assessment of design and other features that could provide inherent protection to avoid or mitigate, to the extent practicable, the effects of an</i></p>

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	<p style="text-align: center;"><i>aircraft impact, with reduced reliance on operator actions.</i></p> <p>If the NRC arbitrarily exempts the ABWR, System 80+, AP600, and AP1000 reactor designs from this stated objective, it will essentially eliminate the requirement for all future reactor designs, too.</p> <p>Consider for a moment the situation if the NRC proposed rule were adopted as currently written. The Acme Reactor Company and Reactors 'R Us, Ltd. dutifully review their new reactor designs for aircraft impacts per the "final" rule. They identify design changes and additional widgets that could reduce reliance on operator actions in event of an aircraft impact, but at a higher cost. They are loathe to voluntarily raise the price tag of their new reactor designs because it would hurt them in the marketplace against the non-aircraft impact resistance ABWR, System 80+, AP600, and AP1000 designs. Just as Davis-Besse's owner successfully resisted the NRC's arbitrary shut down date, vendors with new reactor designs could easily cite the arbitrary exemption of their competitor's designs to "<i>justify non-adoption of potentially advantageous design features, functional capabilities or strategies,</i>" as stated in the proposed rule (p. 56292). The NRC's arbitrary exemption of some new reactor designs has the inherent consequences of barring design upgrades on non-exempt reactor designs, too.</p> <p>The aircraft impact assessment rulemaking must apply to ALL reactors constructed in the future with no exceptions. Americans deserve much more than an empty "IOU" promise from the NRC.</p>
(3)	<p>The NRC proposes to exempt certified but unbuilt reactor designs from considering aircraft impact hazards: the Advanced Boiling Water Reactor (certified in May 1997), the System 80+ (certified in may 1997), the AP600 (certified in December 1999), and the AP1000 (certified in February 2006).</p> <p>It is of more than marginal significance that all of these reactor designs were certified more than 15 years <u>after</u> the NRC published NUREG/CR-1345, "<i>Nuclear Power Plant Design Concepts for Sabotage Protection,</i>" Volumes 1 and 2, January 1981. UCS provides both volumes of this NRC report – obtained from the former LPDR we acquired – as Attachment 1 to our comments. A Design Study Technical Support Group consisting of representatives of the Combustion Engineering System 80 area, the General Electric STRIDE project, the Westinghouse Standardized Nuclear Power Plant project, and other industry companies evaluated design changes to make future reactors less vulnerable to sabotage. They identified changes such as physically separating the emergency diesel generator rooms and locating them on different sides of the plant and relocating the control room and spent fuel pools inside more robust structures. They further evaluated these identified changes as being feasible, beneficial, and cost-effective. Yet those known enhancements are <u>not</u> reflected in the certified ABWR, System 80+, AP600, and AP1000 designs. Both the NRC and the nuclear industry had benefit from the knowledge gained during the development of NUREG/CR-1345, yet neither applied that knowledge to new reactor designs.</p> <p>The American public should not be placed at undue risk simply because the NRC failed to apply knowledge it acquired and documented in the 1981 report when it certified these four reactor designs. It's not the American public's fault that the NRC put NUREG/CR-1345 on the shelf and ignored its findings while the agency certified these four reactor designs. The American public must not pay for NRC's inadequate performance.</p>

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	<p>Had one of the four aircraft hijacked on 9/11 struck an operating U.S. nuclear power reactor, there is ZERO chance that the NRC would even be entertaining the notion of exempting certified but unbuilt reactor designs from considering aircraft impact hazards. The NRC must apply the tragic, high-cost lesson from 9/11 and require – not meekly request – that new nuclear power reactors be made more resistant to aircraft hazards. Waiting for Americans to die before requiring protective measures in new reactor designs – tombstone regulation – is simply unacceptable.</p> <p>None of these four reactor designs has been built in the U.S. or is currently being built. An exemption is unwarranted. ALL new reactor designs, no matter when they were certified, must be equally applicable under the aircraft impact assessment rulemaking.</p> <p>It was a mistake for the NRC and the nuclear industry not to incorporate and consider the results from NUREG/CR-1345 when it was reviewing the four reactor designs now certified. The NRC must not now compound that mistake by excluding these four deficiently certified reactor designs from this rule. After all, to quote the Commission from the proposed rule (page 56287):</p> <p style="text-align: center;"><i>The Commission believes it is prudent for nuclear power plant designers to take into account the potential effects of the impact of a large, commercial aircraft.</i></p> <p>We concur that it is indeed prudent to do so. It naturally follows that it would be imprudent NOT to take into account these aircraft impact effects. By considering it prudent to be done yet allowing it not to be done, the Commission could and should be considered criminally negligent if Americans are killed by an aircraft impacting a reactor exempted from the prudent assessments and upgrades.</p>
(4)	<p>The NRC stated on page 56291 column 1 “<i>The NRC recognizes that the decision to rely on design features (as opposed to operator action or mitigative strategies) is complex, and often involves a set of trade-offs between competing considerations.</i>” Likewise, on page 56293 the NRC stated “<i>it would not be practicable to introduce a design feature that would have adverse safety or security consequences under a different operational or accident scenario.</i>”</p> <p>We are concerned that the proposed rulemaking language sets the stage for mere documentation of the status quo rather than producing the more resistant designs being sought. The proposed rulemaking language lacks criteria that could be applied to steer the trade-offs to anything but an “okay as-is” outcome.</p> <p>For example, in the first column on page 56294 the NRC suggests one of the design changes might involve a new wall to provide better protection against aircraft impacts. Installation of that new wall can and will likely affect heating, ventilating, and air conditioning flows in the building. If temperature control is adversely affected, the electrical equipment in that area will be unable to meet the environmental qualification (EQ) requirements in 10 CFR 50.49. Absent some criteria with which to evaluate the benefits derived from the new wall versus the cost of replacing electrical equipment to meet a higher EQ profile, the regulatory requirement will trump the beyond-design-basis enhancement every single time. Similarly, there are plenty of regulations governing coatings, combustible material loadings, etc. that can be adversely affected by any proposed design resistance upgrade.</p>

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	<p>As an additional example, a vendor might “consider” a design change in which exterior reinforced concrete walls are tripled in thickness to provide enhanced robustness against aircraft impact. But, such a commendable change from a security perspective has an adverse safety implication – namely, the thicker walls afford reduced convective heat flow through the walls.</p> <p>In these and countless other examples, a potential security design change with a positive value of 1,000 could be dismissed if it had an associated negative safety impact of ½ . As presently worded, a miniscule adverse safety consequence can completely trump a humongous security upgrade.</p> <p>The aircraft impact assessment rulemaking must incorporate appropriate criteria so as to prevent the very real trade-offs encountered during the assessment from always defaulting to the “no change required” outcome.</p> <p>A viable, practical means of providing appropriate criteria was presented to the NRC on April 28, 2003, (available in NRC’s ADAMS via accession number ML031200807) by UCS and the Mothers For Peace of San Luis Obispo. UCS and Mothers For Peace petitioned the NRC to deal with aircraft hazards at existing reactors analogously to how the agency earlier dealt with fire hazards following the Browns Ferry fire in 1975. The NRC adopted fire protection regulations that required each licensee to (a) establish discrete fire areas within the plant, (b) assume the equipment, cabling, and components in each fire area – individually – was disabled by fire, and (c) determine whether sufficient equipment outside of each affected fire area survived to allow the reactor to attain and maintain a safe shutdown condition. This model could be applied to new reactor designs via this rulemaking by requiring reactor designers to (a) establish discrete aircraft impact zones for the plant, (b) assume the equipment, cabling, and components in each impact zone – individually – was disabled by impact and direct consequence (e.g., fire), and (c) determined whether sufficient equipment outside of each affected impact zone survived to allow the reactor to attain and maintain a safe shutdown condition. Because the NRC considers the aircraft impact hazard to be a beyond-design-basis event, this fire hazard model would be suitable for the new reactor design aircraft impact rulemaking because certain design basis requirements, like the single-failure criterion and crediting only safety-related components, are not applicable.</p>
(5)	<p>The Technical Issues discussion beginning in the first column of page 56292 does not clearly require the assessments to consider all real consequences of an aircraft impact. For example, paragraph V.C.3.a requires the assessments to consider “thermal effects resulting from fire” and paragraph V.C.3.c requires the fire assessments to “consider the extent of structural damage and aviation fuel deposition.” But other real consequences, such as the effect of smoke on equipment and personnel are apparently excluded from the assessment scope. Even in cases where the evaluations indicate the aircraft and its jet fuel remain outside structures, heavy smoke could be drawn into the ventilation supply for the emergency diesel generators and/or control rooms with adverse consequences. Additionally, operating experience demonstrates that inadvertent actuation of the fire suppression system (e.g., Surry during its pipe rupture event) and rupture of fire headers (e.g., Columbia Generation Station event) impedes operator response times and threatens operability of safety equipment.</p>

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	<p>The 1982 Argonne study of aircraft impacts (NUREG/CR-2859, attached) clearly indicates that the physical impact of an aircraft on a structure has more consequences than are determined by whether that aircraft, or pieces of it, penetrate through the structure. The violence associated with the impact can cause motion exceeding that resulting from design basis and operational basis earthquakes.</p> <p>The 1987 study of electrical relay chatter caused by an earthquake (NUREG/CR-4910, excerpts attached) revealed another direct consequence of a postulated aircraft impact that must be considered. On page 6-5, this study reported:</p> <p style="padding-left: 40px;"><i>The number of min cut sets [minimum cut sets, meaning postulated scenarios leading to core meltdown] found at LaSalle-2 is so large that, given an earthquake strong enough to cause LOSP [loss of offsite power], the probability that at least one of these cut sets will occur is very high.</i></p> <p>Clearly, a direct consequence – namely, relay chatter – of an aircraft impact having a high probability of core meltdown cannot be excluded from consideration.</p> <p>The rulemaking must clearly require assessments to explicitly consider potential consequences from smoke and consequential equipment actuations and/or failures.</p>

Attachments:

1. Ericson, David M. Jr. and Varnado, G. Bruce. 1981a. *Nuclear Power Plant Design Concepts for Sabotage Protection, Volume I*. Sandia National Laboratories report NUREG/CR-1345 for the Department of Energy (DOE) prepared for the Nuclear Regulatory Commission (NRC). January.
2. Ericson and Varnado. 1981b. *Nuclear Power Plant Design Concepts for Sabotage Protection, Volume II Appendices D, E, F, G*. Sandia National Laboratories report NUREG/CR-1345 for the Department of Energy (DOE) prepared for the Nuclear Regulatory Commission (NRC). January.
3. Kot, C. A.; Lin, H. C.; van Erp, J. B.; Eichler, T. V.; Wiedermann, A. H.; 1982. *Evaluation of Aircraft Crash Hazards Analyses for Nuclear Power Plants*. Argonne National Laboratory report NUREG/CR-2859 prepared for the Nuclear Regulatory Commission (NRC). June.
4. Budnitz, R. J.; Lambert, H. E.; and Hill, E. E., 1987. *Relay Chatter and Operator Response After a Large Earthquake*. Future Resources Associates Inc. report NUREG/CR-4910 (excerpts) prepared for the Nuclear Regulatory Commission. August.