



# Nuclear Energy Information Service

*Illinois' Nuclear Power Watchdog for 26 years*

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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](mailto:SECY@nrc.gov)

Comments Proposed Rule RIN 3150-AL19

In response to the notice in the Federal Register dated October 3, 2007 (Vol. 72, No. 191, pp. 56287-56308) Nuclear Energy Information Service (NEIS) of Chicago submits the following comments on the United States Nuclear Regulatory Commission's (NRC) proposed rule "Consideration of Aircraft Impacts for New Nuclear Power Reactor Designs."

NEIS fully endorses the submitted comments of: Beyond Nuclear, Greenpeace USA, Pilgrim Watch, the Union of Concerned Scientists, and the Alliance for Nuclear Responsibility on the proposed NRC rulemaking, "Consideration of Aircraft Impacts for New Nuclear Power Reactor Designs."

In addition to the comments of the above listed organizations, NEIS submits the following comments for consideration. Some are generic to the entire rule; some illustrate the special significance of the proposed rule for Illinois, the most nuclear-reliant state in the US, which also has one of the world's busiest airports less than 30 minutes of flight time to 17 reactors. For us this NRC rulemaking is no mere intellectual exercise; it is an expression of concerns grounded firmly in our unique reality. For this reason we fully expect NRC to take these and the comments of all respondents seriously; and be willing to engage in future formal discussions to implement action plans with the policy makers cc'd who will also receive our comments.

Sincerely,

David A. Kraft  
Director

## **THE COMMENTS OF NUCLEAR ENERGY INFORMATION SERVICE ON THE NRC'S PROPOSED AIRCRAFT RULE**

In response to the notice in the Federal Register dated October 3, 2007 (Vol. 72, No. 191, pp. 56287-56308) Nuclear Energy Information Service (NEIS) submits the following comments on the United States Nuclear Regulatory Commission's (NRC) proposed rule "Consideration of Aircraft Impacts for New Nuclear Power Reactor Designs."

### **I. General Comments And Observations On Select Aspects Of The Proposed Rule**

A.) In **Introduction** NRC writes,

*"The Commission has determined that the impact of a large commercial aircraft is a beyond-design-basis event... 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."*

**COMMENT:** Then perhaps the correct conclusion is that it is *no longer reasonable* for a licensee to defend a reactor with *only* a private security force. Perhaps utilities should be required to contract services for a fee with the U.S. military or the National Guard, since Guard units are already an integral component of emergency response and evacuation plans.

B.) In **Introduction** NRC writes,

*“The Commission has addressed aircraft attacks by regulatory means other than the DBT rule in 10 CFR 73.1. By Order dated February 25, 2002 (Interim Compensatory Measures (ICM) Order), the Commission required all operating power reactor licensees to develop and adopt mitigative strategies to cope with large fires and explosions from any cause, including beyond-design-basis aircraft impacts (67 FR 9792; March 4, 2002).”*

**COMMENT:** The Commission may have “addressed” the issue of aircraft attacks; but it clearly failed to “resolve” the problem satisfactorily. Requiring the development and adoption of strategies to cope with large fires and explosions merely deals with *after-the-fact* damage controls, not with “*avoidance or mitigation*” — which NRC states is the *purpose* of this exercise. The horses have already left the barn at this stage of intervention. It would be like no longer requiring reactor containment if the utility had a good enough evacuation plan in place. This does nothing to provide “adequate protection of the public health and safety and common defense and security,” credit for which the NRC too often and facilely claims throughout this document.

C.) The NRC has chosen to exempt existing reactors from this rulemaking:

**“II. Currently Operating Power Reactors:** *The Commission has determined that the existing designs of currently operating nuclear power plants, together with the security program actions mandated by the NRC’s orders (some of which are codified in the NRC’s final DBT rulemaking and others of which are being incorporated into other NRC regulations), as well as the protection provided by other Federal, State, and local entities, provide an adequate level of protection to public health and safety and common defense and security against aircraft impacts.”*

**COMMENT:** One fails to understand how the public health, safety and common defense is either preserved or enhanced by exempting 104 reactors and spent fuels pools from truly preventive requirements. We now know which reactors terrorists would target first. ALL reactors should be subject to this rule; and reactors which have been granted operating license extensions should also meet the requirements of this rule, or forfeit their extension.

This rule should not be about the intellectual masturbation of balm NRC’s distorted perception of protecting the public. It should be about defending the nation and its people from the reality of 911-II. This rule is akin to requiring post-Titanic retrofits against iceberg damage on only the port side of ships.

**COMMENT:** Further, NRC seems confident that, “*the protection provided by other Federal, State, and local entities, provide an adequate level of protection to public health and safety and common defense and security against aircraft impacts.*” Are we to infer from this that NRC considers the following as examples of “adequate” standards of functioning from now on?:

- **O’Hare screeners flunk fake-bomb tests**, By Jon Hilkevitch, Tribune transportation reporter, 6:20 PM CDT, October 18, 2007

“Six years after the Sept. 11 attacks, undercover investigators were still able to smuggle decoy explosives through O’Hare International Airport at alarming rates, leading to calls Thursday for better training of security screeners, higher on-the-job performance standards and harsh consequences for failure....

“It found that screeners at O’Hare’s passenger security checkpoints **failed to detect 60 percent of simulated explosives** that were hidden in carry-on bags or in the clothing of undercover agents working for the U.S. Transportation Security Administration.

“The failure **rate was even worse—about 75 percent—among TSA screeners at Los Angeles International Airport**, according to the classified report, which was obtained by USA Today.”

A 60-75% failure rate may be acceptable for NRC rulemaking; it is not acceptable performance to the residents of an already excessively nuclear Illinois.

- **White House to Cut Anti-Terror Funds**, The Associated Press, Friday 30 November 2007

**Homeland Security grants may be cut by more than half, documents show.**

"Washington - The Bush administration intends to slash counterterrorism funding for police, firefighters and rescue departments across the country by more than half next year, according to budget documents obtained by The Associated Press....

"The White House routinely seeks to cut the budget requests of federal departments, but the cuts proposed for 2009 Homeland Security grants are far deeper than the norm. Congress has yet to approve the department's 2008 plan...."

We welcome the NRC's explanation as to how severe budget cuts in the HLS budget will enhance protection coming from TSA, state and local airport inspectors and law enforcement teams –which NRC has invoked in the past as the preferable and required first line of defense against terrorist hijacking of commercial airliners, and its main excuse used to deny requests for previous air defenses at existing reactors.

- **Pentagon to Alert 8 Guard Units for Duty**, By LOLITA C. BALDOR, Associated Press Writer, 8:25 PM CDT, October 17, 2007

"WASHINGTON-- The Pentagon is preparing to alert eight National Guard units that they should be ready to go to Iraq or Afghanistan beginning late next summer, The Associated Press learned Wednesday.

"According to defense officials, seven of the units would deploy to Iraq and one to Afghanistan....Two of the units will be full combat brigades heading to Iraq -- between next summer and into 2009, to serve as part of the rotation with active duty troops. There are currently 20 combat brigades in Iraq, but under plans mapped out by President Bush and his top commanders, that number will gradually drop to 15 next year, as the U.S. reduces its troop presence there.

"Those two Guard brigades would include about 3,500 soldiers each -- generally the size of a combat brigade. But the other five going to Iraq will be much smaller brigades that are tailored for specialized support operations, mostly security and detainee operations. Their sizes vary, but some would be about 1,000 troops...All together, the Guard announcement would involve about 20,000 soldiers.

"Specific brigades were not identified, but they will include units from North Carolina, Oklahoma, Illinois and Hawaii, according to officials....

"A key element of the plan calls for sending the Guard brigades in fully intact units, complete with their own commanders and headquarters, rather than breaking them up and spreading them around, as has been done in Iraq in previous Guard deployments. Lt. Gen. H. Steven Blum, chief of the National Guard, has made that a priority, saying his brigades are more effective working as teams....

"Previously, Guard soldiers would spend up to six months training before going overseas for 12 months -- forcing them to be away from home for as long as 18 months. More recently, brigades in Iraq -- including some Guard units -- saw their deployments extended to up to 15 months on the battlefield....The new plan would have them spend several months at home training, then the remainder of the year at the battlefield.

"As of this summer, more than 185,000 Guard members had served in either Iraq or Afghanistan over the past six years and more than 28,000 of them had been deployed more than once."

NEIS would point out that the Illinois National Guard plays a prominent critical role in the Illinois Radiological Emergency Response Plan already. The absence of an entire brigade for a year or more creates an enormous hole in radiological emergency response plans. For NRC to believe that the State has the resources left under these consistently unpredictable circumstances to further respond "adequately" to the consequences of an aircraft impact at one of our reactors is stretching credulity to the limit.

These examples should clearly make the case for first enhancing protection at reactors that already exist in the real world, as opposed to the yet-to-be-built reactors existing in NRC regulatory fantasyland.

Indeed, one could make the case that regulators who are aware of the above circumstances at **existing** reactors and still consider the public health safety and common defense and security "adequately" defended are a far greater threat to national security than al Qaeda could ever be. Unlike terrorists who will only come and do their damage once in a great while, these unseeing regulatory minds are in the public employ 24/7 constraining effective actions routinely.

D. Voluntary enhancements:

In Section III NRC contends,

**“III. Currently Approved Standard Design Certifications: ....The NRC encourages voluntary enhancement by the applicants for the four current standard design certifications because it will increase the already high levels of safety and security provided by these reactor designs.”**

**COMMENT:** NEIS would submit that “voluntary” protection of the public health and safety and common defense and security in – inadequate. “Voluntary” does not work in a timely enough manner. Since none of these reactors are yet constructed, there is still a window to incorporate the kinds of changes possible and necessary into these designs before utilities engage in construction, and potentially more expensive retro-fits at a later date.

E. Reactor Component Aging and Aircraft Impacts:

In Section IV, **Renewal of a Standard Design Certification, Combined License, or Manufacturing License**, NRC contends:

*“The NRC’s requirement for assessment of large, commercial aircraft impacts is not an aging-related matter, nor is it based on time-limited considerations. Hence, aircraft impacts under the proposed rule are outside the scope of any combined license renewal proceeding under 10 CFR part 54 and combined license holders do not need to update the assessment required by 10 CFR 52.500(b) at the license renewal stage.”*

**COMMENT:** NEIS takes exception to this conclusion on both intuitive and historic grounds.

Intuitively, we can think of no case where the progressive aging of reactor components has left them in better, more durable, more -- dare we say --“robust” condition metallurgically or functionally speaking. Reactor components age – and deteriorate. They do not improve with age.

We juxtapose this intuition with the reality that at the Quad Cities reactors in Illinois, power uprates left both NRC and Exelon with the conclusion that, “higher vibrations caused by extended power uprate which started in 2002” contributed to valve actuator damage observed in 2005.

Age does matter, apparently; especially at existing reactors. NRC seems to understand this (see: *(Part V: Newly Designed Power Reactors, Sec. C, Aircraft Impact Results, Technical Issues 3b, Shock assessment)*), yet does not seem inclined to act upon their professional knowledge for some reason.

NEIS would suggest that aircraft impacts would introduce other unanticipated vibrations, forces and effects on already aged and stressed components. NEIS encourages NRC to revisit their thinking on the synergies between component aging and aircraft impacts. Reasons and calculations for this request appear in the next section.

**II. Re-Submittal Of Revised NEIS Comments To The 2006 NRC Design Basis Threat Rulemaking Pertinent To The Present Rulemaking:**

In 2006 NEIS responded to NRC’s proposed rulemaking, *Proposed Rule: Design Basis Threat [RIN 3150-AH60]*, which would have resulted in changes to 10 CFR Part 73 Regarding The Design Basis Threat For Security At Licensed Nuclear Facilities. We re-submit below a revised section of that testimony pertinent to the present rulemaking, specifically dealing as it does with the present real-world threats from today’s and future commercial and military aircraft.

**REAL-WORLD CONSIDERATION: THE AIRBUS A-380 AS A POTENTIAL TERRORIST WEAPON  
(taken from 2006 NEIS comments to NRC)**

Following up on the generic comments for Section 73.1 of CFR Part 73, NEIS wishes to present a real-world consideration that has actual meaning for Illinois, as well as for the majority of all currently operating nuclear reactors in the U.S. It will also have obvious implications for the siting of many of the 31 proposed future reactors that will be built in a world with even larger commercial aircraft than those of today, and near airports with ever-increasing daily flight loads.

The NRC's re-consideration of amending the DBT regulations has a unique and critically important impact on the reactor situation for Illinois. First, Illinois has 11 operating and three closed reactors, plus their attendant spent-fuel pools – more than any other state. Thus, Illinois has the most to lose if NRC sets an inadequate standard.

In addition, subsequent to the 2006 rulemaking, two entities in Illinois have petitioned the U.S. Dept. of Energy for consideration under the Global Nuclear Energy Partnership (GNEP) RFP to build initially experimental, then commercially viable facilities dedicated to the reprocessing of irradiated (“spent”) reactor fuel, and possible construction of experimental scale followed by commercial scale Gen. IV reactors.

Illinois also has the World's busiest/second—busiest airport (depending on the year) at O'Hare Field adjacent to Chicago. Over 700 flights depart from O'Hare on any given day, many of them fully-loaded international flights.

NEIS has calculated that all reactors operating and closed in Illinois, plus the three operating reactors in western Michigan are all less than 28 minutes of normal-appearing flight time to O'Hare Field. The proposed GNEP sites are at Argonne National Laboratory southwest of Chicago; and at the GEMO Morris Operation in Morris across the road from the Dresden Nuclear Power Station. Both are less than approximately nine minutes flight time to O'Hare. This information is summarized in Table 1:

**Table 1. “Normal” Appearing Flight Times and Approximate Distances between O’Hare Field and Illinois/Michigan Reactors**

REACTOR	Braidwood 1&2	Byron 1&2	Clinton 1(&2?)	Dresden 1,2, &3	LaSalle 1&2	Quad Cities 1&2	Zion 1&2	Palisades, MI	Cook 1&2, MI
Approx. distance in miles to O'Hare	51	69	136	44	60	142	29	80	62
Est. flight time in minutes from O'Hare Field	10	14	27	9	13	28	6	16	12

The assumptions made in making the calculations are as follow: an international outbound jet airliner flight taking off from O'Hare Field, making its normal initial ascent to 20,000 ft and initial cruising speed of 350 mph. Both the height and speed increase the farther the distance from O'Hare, ultimately reaching 33,000 ft and as much as 600 mph. These values are personally verified by numerous outbound international flights from O'Hare since September 11, 2001.

In the case of a terrorist hijacking, a flight taking off with these characteristics would show no cause for alarm on any air-traffic controller screen, until such time as the flight was commandeered and forced off course. It would then display change in altitude, and probably a rapid increase in speed, lessening the flight times to the reactors and time for response even further than the calculated values above.

Many of the daily flights from O'Hare are fully-loaded international flights. Pressures on the airline industry to fill seats will certainly guarantee near maximum take off weights in the future, as well as maximal fuel and baggage storage.

In 2007 the Airbus A-380 jetliner paid its first visit to O'Hare Field. It will be available for commercial service as early as 2008-09 at U.S. airports. Initially, the A-380 is slated for East Coast arrival; but eventually, is expected to arrive at O'Hare Field on a more regular schedule.

The A-380 is now the largest commercial jet in the skies. Maximum take-off weight will exceed 500 tons. Maximum fuel capacity is around 300,000 litres of aviation fuel.

These numbers dwarf the largest of the in-service and planned Boeing aircraft:

In service:

- Boeing 747-8 (intercontinental, cargo) : 485 tons; 243,120 litres
- Boeing 747-400ER (freighter): 455 tons; 216,840 litres

In design:

- Boeing 777-300ER: 388 tons; 181,280 litres

Using nothing more sophisticated than a pocket calculator and a physics text book (both presumably available to terrorists as well as students), NEIS established a crude calculation of the kinetic energy and force on impact that an Airbus A-380 would impart, fully loaded at 500 tons, and assuming two different air speeds. We summarize our sample results below in Table 2.:

**Table 2.: Kinetic Energy and Force on Impact of 500 ton Airbus A-380, at various speeds and impacts**

Kinetic energy	At 350 mph	$6.12 \times 10^9$ joules
	At 600 mph	$1.80 \times 10^{10}$ joules
Force on impact (0.5 second impact ("impulse"))	At 350 mph	$1.57 \times 10^8$ Newtons
	At 600 mph	$2.68 \times 10^8$ Newtons
Force on impact (0.01 second impact ("impulse"))	At 350 mph	$7.85 \times 10^9$ Newtons
	At 600 mph	$1.34 \times 10^{10}$ Newtons

We assumed the two airspeeds, given that the slower speed mimicked well the "normal" appearing aircraft speed, and was also reported to be the speed at which the 911 attacks were carried out on the Pentagon. The higher speed represented the estimated speed at which the 911 attacks occurred on the World Trade Center, and also reflect the "go for broke" last minute burst of speed that these aircraft are capable of in the hands of potential terrorists. The two force calculations reflect an arbitrary assumption reflecting the time over which the final impact would occur. The first time of 1/2-second seems unrealistically low, but was used to establish a lower base rate. The faster 1/100-second impact seems more in line with the impact of a fast moving aircraft, and establishes something of an upper range for force calculation.

Admittedly, these calculations are crude estimates. Regardless, they demonstrate the amount of energy and force that would be imparted on not just hardened reactor containment buildings, with their much touted 3-4 ft. thick reinforced concrete walls, but also on less-hardened, less reinforced reactor spent fuel pools *outside* of the containment buildings, with only 18" thick walls; and also the upcoming arrays of onsite "dry-cask storage" containers, left out in the open under current NRC design approval.

It is incumbent on NRC and the nuclear industry to demonstrate that these edifices can withstand these forces and energies, while preventing the 1,000-Hiroshima's worth of radiation stored inside the reactor cores, and the equally threatening amounts for the reactor spent-fuel pools from escaping into the environment. NRC DBT regulations need to *require* that such an ability exists for any and all reactors – operating, license-extended, design-approved, or proposed. If reactors and spent-fuel pools are not able to withstand such collisions, they do not belong in operation in the post-911 world. If this is the case, NRC must rescind all presently issued reactor license extensions; call a moratorium on future ones; and insure that all upcoming reactor designs can withstand these impacts.

## **SECONDARY/INDIRECT DAMAGE POTENTIALS:**

However, it should be noted that the damage from the direct collision impacts alone may not be the only source of damage capable of causing serious reactor or spent-fuel pool radiation releases. This much is acknowledged in the present proposed rule itself (*Part V: Newly Designed Power Reactors, Sec. C, Aircraft Impact Results, Technical Issues 3*).

**Spent-Fuel Pool Damage:** For example, the spent fuel pools at the aged Dresden and Quad Cities reactors are situation *above ground*, and in less-reinforced buildings than the reactors themselves. While a reactor containment may or may not be breached, with source term loss, damage to the machinery and piping supplying cooling water to the spent-fuel pools is an equally likely possibility. The 300,000 litres of burning aviation fuel and ignited baggage/cargo would be more than enough to complicate the problems of a drained spent-fuel pool, possibly even being enough to ignite some of the fuel cladding and escaped hydrogen gas.

**Vibration:** Another example of concern has already been demonstrated by the recent valve actuator damage at the Quad Cities reactors, attributed to "higher vibrations caused by extended power uprate which started in 2002." As mentioned above these are among the oldest reactors in both Illinois and the US. They have also been granted a power uprate, and a 20-year license extension. Initial investigation by NRC and Exelon of this problem attributed degradation to "excessive vibration," suggesting that perhaps trying to squeeze more power out of older reactors was stressing them more, or in unexpected ways.

NEIS would suggest that the added "stress" of a 500 ton aircraft crashing into such an aging and possible more "sensitive" reactor, operating at higher power than originally designed, might cause additional unexpected component failures as secondary crash effects, even if containment is not breached. These may have safety system implications for the

reactors. For this reason, airplane crashes may have more of a safety implication for reactors than is evidenced in a merely straightforward and overly narrow examination of containment failure.

**CONCLUSION:**

To conclude this section, the potential for airline crashes into Illinois reactors is a very real, and unique potential threat to Illinois, given the juxtaposition of the World's Busiest Airport with as many as 14 operating reactors. Similar situations certainly exist in the New York/New Jersey area; and for reactors in the vicinity of Atlanta, GA. The revised DBT – and any and all future reactor licensing and re-licensing determinations-- *must* take this into account. Given the information provided above, neither the NRC nor the nuclear industry – nor the many public officials to whom NEIS will be sending copies of these remarks – will be able to plead “ignorance” for the results of future events, if such protections are not instituted.

We thank the NRC for the opportunity to share these views. We urge the Agency take a qualitatively more proactive approach in these matters, and extend and implement this rule to all existing as well as proposed reactors.