Nuclear Energy Information Service

"Illinois' Nuclear Power Watchdog for 25 years"

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February 22, 2006

Re: NRC Proposed Rule: Design Basis Threat [RIN 3150-AH60]

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

Attn: Rulemakings and Adjudications Staff
Submitted via mail and e-mail to SECY@nrc.gov

NUCLEAR ENERGY INFORMATION SERVICE (NEIS) COMMENTS TO PROPOSED RULE 10 CFR PART 73 REGARDING THE DESIGN BASIS THREAT FOR SECURITY AT LICENSED NUCLEAR FACILITIES

I. INTRODUCTION

Nuclear Energy Information Service (NEIS) is a safe-energy organization based in Evanston, Illinois. We appreciate the opportunity to provide comments concerning the Design Basis Threat (DBT) for security at nuclear reactors in the U.S. We do not wish to repeat the many fine comments already submitted by our colleagues from around the country as to the current inadequacy of NRC regulations in this matter. Rather, we will focus our comments in three areas, and use examples specific to Illinois that will also be generic enough to be extrapolated to the majority of operating reactors in the country. These examples will amplify in a real-world way the comments provided to NRC so many times, by so many others already.

II. INADEQUACY OF CURRENT STANDARDS, AS EXPRESSED IN "Sec. 73.1 Purpose and scope.(1) Radiological sabotage, (A) through (E)"

The language of this Section as it currently appears in the January 2005 version of the online version of the Code of Federal Regulations is remarkable for both the inadequacy of what appears, and for the astonishing and dangerous lapse of professional judgment demonstrated by what is absent.

The Section far too narrowly limits for consideration and required regulatory action the size of the intruders' party; and the types of weapons to be considered "usable" by the intruders. Such limits do not match the current, post-911 real world. As such they offer the illusion of regulatory protection bring in place, with virtually no evidence of substance.

Equally appalling is the absence of required consideration of 1.) water-borne assaults, given that ALL reactors in the US require the use of some kind of natural or human-made waterway or body of water; and 2.) the already demonstrated ability to crash commercial jet aircraft into large, sensitive structures with a surprising degree of success and accuracy. Obviously, the NRC has never heard the old adage that, if something has already happened, then it must be possible.

The historic excuse of NRC for not allowing consideration of suicide aircraft crashes into reactors has been that it was too speculative a scenario to be able to be risk-assessed using PRA. That "reality" should be dictated by the technical limits and capability of NRC to conduct adequate mathematical modeling is unacceptable. The public deserves more for the $700+ million plus spent on the annual NRC budget than the rationalization that, "if NRC can't model it, it can't exist or be considered." As Shakespeare said, "There are more things in heaven and earth than are dreamt of in your philosophy."

NEIS rejects nuclear industry claims that current and proposed generations of reactors, and their attendant spent-fuel pools, would be able to withstand a crash of the current and future planned vintages of commercial jet airliners without the potential for large releases of radioactive materials. We find the 2002 analyses done by EPRI on this topic to be flawed

and biased, and not characteristic of real world situations and conditions, as we will demonstrate in the next session. Because so many segments of the study were also kept secret for security reasons, we have only the fox's assessment of the integrity of SOME of the chicken coups – the reactors themselves – to go by. Ignored were the effects on the far more vulnerable spent-fuel pools. As a result, our contention stands as a real possibility that reactor sites remain viable terrorist targets vulnerable to air assault with the likely release of large quantities of radiation.

As a result of these flawed and inadequate, as well as self-serving rationalizations, this section must be amended to fully take into consideration ***all threats*** that are present in the real, post-911 world; particularly those coming from commercial jet aircraft. Anything less should be considered dereliction of duty.

III. REAL-WORLD CONSIDERATION: THE AIRBUS A-380 AS A POTENTIAL TERRORIST WEAPON

Following up on the generic comments for Section 73.1 above, NEIS wishes to present a real-world consideration that has actual meaning for Illinois, as well as for the majority of all nuclear reactors in the U.S.

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.

Second, 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. 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 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 2005 it was announced that the Airbus A-380 jetliner will be available for commercial service as early as 2007 at U.S. airports. Initially, the A-380 is slated for East Coast arrival; but eventually, is expected to arrive at O'Hare Field.

The A-380 will be 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.

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	6.12×10^9 joules
	At 600 mph	1.80×10^{10} joules
Force on impact (0.5 second impact ("impulse"))	At 350 mph	1.57×10^8 Newtons
	At 600 mph	2.68×10^8 Newtons
Force on impact (0.01 second impact ("impulse"))	At 350 mph	7.85×10^9 Newtons
	At 600 mph	1.34×10^{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 over. The first time of ½-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.

What NRC and the nuclear industry have to do is demonstrate that these edifices can withstand these forces and energy, while preventing the 1,000-Hiroshima's worth of radiation stored inside from escaping into the environment. NRC DBT regulations need to *require* that such an ability exists. 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.

However, it should be noted that the damage from the direct impacts alone may not be the only source of damage capable of causing serious reactor or spent-fuel pool radiation releases.

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 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.

Another example of concern is shown with 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 have 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.

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.

IV. THE DBT REVISIONS AND THE PARABLE OF THE 50.54 LETTER

While NEIS welcomes the opportunity to provide these comments to NRC concerning revising the DBT, we must admit that we are totally skeptical about NRC's commitment to real DBT change, and use of the materials it will be receiving. While both members of Congress and the public requested an extension of time to submit comments past the January deadline, the NRC denied their request. It was not until the nuclear industry requested an extension that the NRC permitted the extension of this date. This attitude plus the following historic example serve to back our position of skepticism.

In the mid-to-late 1990s, in response to consistently poor performance at Illinois reactors, NRC sent (then) Commonwealth Edison a 50.54 letter. The letter was unique in that it not only required ComEd to analyze its problems and create and implement solutions; it also required ComEd to *explain in detail to NRC why ComEd should be believed this time that their methods would work, when they had failed to improve so frequently before.* While a laudable goal, NRC never followed up on getting ComEd's explanation, and gave them a pass.

NEIS finds itself in a similar situation in taking the NRC seriously about DBT revisions. For the better part of a decade (the 1990s), NRC systematically ignored the pleas to improve reactor security and safety coming from competent critics like Paul Leventhal and physicist Ed Lyman of the Nuclear Control Institute; Dan Hirsch of the Committee to Bridge the Gap; and nuclear engineer David Lochbaum of Union of Concerned Scientists. Indeed, almost up to the very day of Sept. 11, 2001, NRC was prepared to allow the nuclear industry tremendous self-monitoring latitude in this critical area of reactor security and safety. This, in spite of the dismal 47% failure rate for intruder repelling amassed by the nuclear industry at the hands of former Navy SEAL Capt. David Orrick.

After 911 we see as late as mid 2005 Time Magazine reporting that the guards at US nuclear reactors seem to have a vastly different impression of their ability to "resist a determined intruder" than does either the nuclear industry or the NRC. And as late as January, 2003, some 40% of NRC staff "…lack confidence in decisions made by the NRC's senior management." (Source: Associated Press, Jan. 9, 2003)

With this as a backdrop, it is both logical and rational for all participants in the DBT Revision process to seriously ask the question:

Given a history of demonstrated NRC indifference, a penchant for NRC to allow the industry to exert undo influence on its own regulation in the area of reactor security and safety, and the very real event of 911 demonstrating the inadequacy of existing DBT standards, why should anyone believe that NRC will be doing anything meaningful this time to protect the public health and safety?

This is no rhetorical question. In fact, NEIS formally requests a written, detailed response to it, so we can send it to the others on the service list for our comments, and to the media. Failure to reply will be further confirmation that this process is merely "business as usual."

Respectfully Submitted,

David Kraft, Director

Cc:
Sen. Richard Durbin
Sen. Barack Obama
Gov. Rod Blagojevich
Atty General Lisa Madigan
Rep. Jan Schakowsky
Rep. Ed Markey