

THREAT OF SABOTAGE AND TERRORISM TO COMMERCIAL NUCLEAR POWERPLANTS

OVERSIGHT HEARING

BEFORE THE

SUBCOMMITTEE ON GENERAL OVERSIGHT AND INVESTIGATIONS

OF THE

COMMITTEE ON INTERIOR AND INSULAR AFFAIRS HOUSE OF REPRESENTATIVES

ONE HUNDREDPH CONGRESS

SECOND SESSION

ON

THREAT OF SABOTAGE AND TERRORISM TO COMMERCIAL NUCLEAR POWERPLANTS

HEARING HELD IN WASHINGTON, DC

MARCH 9, 1988

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Statement of

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Before the

SUBCOMMITTEE ON GENERAL OVERSIGHT AND INVESTIGATIONS

of the

COMMITTEE ON INTERIOR AND INSULAR AFFAIRS

U.S. HOUSE OF REPRESENTATIVES

Regarding
PROTECTION OF NUCLEAR REACTORS FROM TERRORISM AND SABOTAGE

March 9, 1988

Washington, D.C.

Introduction

My name is Daniel Hirsch. I am Director of the Program on Nuclear Policy, an interdisciplinary research and teaching program at the University of California, Santa Cruz, and chair of the Program's Nuclear Terrorism Research Group which, for several years, has been examining questions related to the adequacy of current protections against theft of nuclear materials and against sabotage of nuclear facilities. I appreciate the invitation by the Subcommittee to report to you on the results of some of the latter work; it should be made clear at the outset, however, that any views expressed here today are solely my own and not necessarily those of the University of California.

Nowhere is the terrorist threat of more concern than in the nuclear area. The fear that subnational groups might acquire nuclear weapons--particularly through theft of plutonium or weapons-grade uranium--is one of the genuine nightmares of our age. A companion fear, although not as thoroughly studied to date, is that terrorists could threaten to destroy nuclear energy facilities, resulting in vast quantities of radioactivity being dispersed over large areas of populated territory.

Given this country's oft-stated priority of dealing effectively with the terrorist threat, and given that few aspects of the terrorist threat are more worrisome than the prospect of nuclear terrorism, one would presume that very high priority would therefore be given to protecting nuclear facilities. A review of the record in this regard suggests that this is far from the case. National policy regarding nuclear terrorism appears far more a case of avoiding than of coming to grips with the problem.

We have performed several studies regarding the current failure to adequately protect nuclear reactors from terrorist attack or sabotage. As I can merely summarize their conclusions in this testimony, I request that the full studies be included in the record; a more complete discussion of these matters as well as detailed citations can be found therein. Among the key points:

- o The Nuclear Regulatory Commission (NRC) regulations to protect reactors against sabotage and terrorist acts have not been revised in a decade, despite a tripling in terrorist incidents internationally and a five-fold increase in key safeguards events at U.S. power reactors.
- o Those regulations require protection only against a very small group of "several" saboteurs, acting as no more than a single team, on foot, with relatively small quantities of unsophisticated weapons and explosives, and the assistance of a maximum of one insider.
- o The regulatory exemption for threats not on foot means reactors are not required to be protected against truck bombs.
- o Documents obtained under the Freedom of Information Act reveal that, after the Beirut truck bombings in 1983, the NRC commenced an urgent rulemaking to require such protection. Three months later, the NRC suspended action on the proposed rule, "pending results of research." However, the research results, from a study by Sandia National Laboratory, had been provided to the NRC two weeks earlier. The Sandia conclusions:

The results show that unacceptable damage to vital reactor systems could occur from a relatively small charge at close distances and also from larger but still reasonable size charges at large setback distances (greater than the protected area for most plants).

- o Four years later, the NRC still has not acted to require protection against truck bombs at reactors.
- o The failure to come to grips with the truck bomb threat is symptomatic of a larger regulatory failure in the nuclear terrorism area.

These and related matters are discussed in more detail below.

The NRC's "Design Basis Threat" Regulations

The maximum terrorist attack against which commercial nuclear power plants in the United States are required to be protected is called by the NRC the "design basis threat" (DBT). Like its cousin, the design basis accident--the DBA, the worst accident for which reactors are required by the NRC to be prepared, one in which the core doesn't melt--it is characterized less by what nuclear facilities must protect against than what they need not and as such are both a kind of regulatory fiction. The NRC's current DBT regulations exempt nuclear power plants from having to protect against radiological sabotage attempts by:

- o more than one insider;
- o more than "several" external attackers (defined in the NRC case law as an astonishingly small number)
- o attackers capable of operating as more than one team, i.e., capable of employing "effective team maneuvering tactics" [41 FR 34310 (July 5, 1977) at 34311];
- o weapons of greater sophistication than hand-held automatic weapons or explosives or other equipment in quantities or sizes larger than can be hand-carried (e.g., no requirement to protect against truck bombs); and
- o "enemies" of the United States, a term undefined in the regulations except as to include both nations and persons.

10 CFR 73.1(a) (1), 10 CFR 50.13

Furthermore, to defend against radiological sabotage that could affect tens of thousands of citizens, nuclear facilities are required by the NRC to have only a minimum of five armed guards or other armed, trained personnel. (10 CFR 73.55(b)(3)) (It should be noted that, although the NRC has concluded that this number of guards is sufficiently "conservative" to repel the maximum threat to a facility, even the nuclear industry finds this an absurdly low level, with many licensees employing substantially larger numbers than the regulations prescribe.)

Most of these safeguards requirements--or perhaps more accurately stated, safeguards exemptions--were promulgated in the 1974-1976 period and became final in early 1977. The prohibition against considering protection against attacks by "venomless" of the United States came into effect a decade earlier, apparently in an attempt to remove a troublesome issue from a contentious reactor licensing case. Despite a radical increase in the incidence and nature of terrorist and other attacks worldwide, the design basis threat regulations have remained unchanged ever since.

The NRC's Rationale

The design basis threat regulations were rationalized when promulgated on the following bases:

- o Intelligence information that there were no known groups "having the combination of motivation, skill, and resources to attack a fuel facility or a nuclear power reactor"
- o studies (particularly the Rasmussen report, WASH-1400) asserting that redundant safety features made severe core damage "non-credible"
- o the belief at the time that prospective terrorists had demonstrated an unwillingness to undertake actions that would result in large numbers of casualties; the assertion of "moral and political constraints" preventing terrorist action resulting in large damage.

Each of these assumptions has been called into question in the time since the promulgation of rule; thus, these facilities may be unprepared for the real kinds of threats that exist in today's world. In 1979, in the wake of an avalanche of methodological criticisms, the NRC withdrew endorsement of the probability estimates of the Rasmussen report regarding the likelihood of severe core damage accidents. A few months later, the TMI accident provided empirical demonstration that the assumptions of severe fuel damage being "non-credible" were in error even for accidental destruction, let alone intentional acts. (After the accident, the NRC announced that its "design basis accident" assumption--substantial fuel melting asserted to be "non-credible"--had been proven wrong by the TMI incident and that subsequently, at least in environmental assessments, such accidents would be considered. Safety and security regulations, however, which had been based on the erroneous DBA assumptions were not changed.)

Additionally, the capabilities, motivation, and resources of terrorist groups appear to have grown significantly in the period since the NRC arrived at its threat basis. Furthermore, any assumption of "moral and political constraints" preventing terrorists from taking large numbers of lives seems mere wishful thinking in the wake of recent events.

Trends in Terrorism

Perhaps the most important factor undermining the validity of the NRC's current design basis threat and associated security requirements--one which provides a powerful argument for their revision--is the radical change in the incidence and nature of terrorism since those determinations were originally made. For example, since the Nuclear Regulatory Commission promulgated the most recent of these safeguards standards, international terrorist incidents have approximately tripled, from an average of

approximately 130 per year in the nine years prior to the rulemaking to an average of approximately 400 annually in the last few years. (See Figure 1) Fatalities in terrorist acts averaged 10-20 per year in the late 1960s; in the 1980s the figure is 200-700 annually. (Figure 2) The number of incidents with fatalities averaged a little more than 20 per year before the design basis threat was last codified; thereafter the number more than tripled. (Figure 3)

These trends are reflected in the commercial nuclear sector as well. The number of terrorist incidents involving nuclear facilities abroad has risen an order of magnitude since the promulgation of the most recent threat basis. (Figure 4)

One cannot argue that U.S. nuclear power facilities are exempt from these international trends. The NRC's own data compilation for its reactors, the Safeguards Summary Event List, NUREG-0525, indicates that safeguards events, excluding bomb hoaxes, have increased five-fold since the last revision to the design basis threat regulations, up to nearly 70 such incidents in the most recent year reported. (Figure 5) An indication of the seriousness of this domestic trend is highlighted by examining one category of these safeguards events: There were no reported incidents of tampering/vandalism events during the period the design basis threat was being promulgated, but now there are ten or so per year, some quite serious, involving disabling of major safety equipment. (Figure 6)

The capabilities of terrorists have also increased, with simultaneous multiple events coordinated with considerable precision. One of the most dramatic demonstrations that the NRC's design basis threat assumptions are outdated occurred on May 14, 1986, at the Palo Verde Nuclear Power Plant in Arizona. Within minutes of each other, three of four offset power lines

were disabled. Fortunately the reactors were down at the time, as these sabotage acts could have had very serious consequences. To prevent fuel melting, reactors require offsite power to operate cooling equipment; there are backup diesel generators, but these are notoriously unreliable and have been subject to a number of sabotage incidents themselves. Because the power towers are substantial distances from each other and were attacked essentially simultaneously, it appears likely that this incident exceeded the NRC's design basis threat assumptions--the attackers obviously worked as more than one team, appeared to use vehicles, and may well have involved a group larger than what NRC has defined as "several" in its regulatory maximum attacking group.

Even before the Palo Verde incident disproved the remaining vestiges of the underlying assumptions for the NRC's security regulations, the Commission's safeguards chief, Robert Burnett, had reported to the Advisory Committee on Reactor Safeguards that the "conservatism of [the] present security position has decreased." Burnett cited the following factors as resulting in the erosion of the current security position:

- o SIMULTANEOUS MULTIPLE EVENTS
- REENTRY (TWO BOMBING WITHIN 2 HOURS)
- KIMWALT (SIX BOMBS WITHIN 2 HOURS)
- o RECENT COORDINATED ATTACKS ESCALATED TO MASSIVE PERSONNEL CASUALTIES
- o LACK OF SPECIFICITY IN INTELLIGENCE INFORMATION

Nonetheless, the NRC's design basis threat regulations remained unchanged.

Failure to Review Design Basis Threat Assumptions

The increase in capability of potential adversaries and the reduced margin of safety in required protection against these developments are clearly reflected in a 1984 NRC memorandum, SECY-84-216, dealing with security measures at non-power reactors, but equally applicable to all reactors:

Currently available information contains no indication of a specific threat aimed at a domestic nuclear facility. However, recent acts by international terrorists have shown that a significant adversary capability can materialize without sufficient warning from the intelligence community. These recent acts in other countries have also exhibited a significant increase in sophistication, coordination, and willingness to commit violence. Therefore, it may be prudent to consider additional, domestic, security measures. . . .

(emphasis added)

(It should be noted that in some public statements, Commission officials have cited the first sentence in the above statement while leaving out the significant conclusions that follow. It is doubtless true that the NRC currently has no information of a specific group planning a specific terrorist action against a specific nuclear facility. However, prudent security planning does not permit awaiting intelligence information that Group A plans to undertake Action B against Reactor C before protecting reactors against possible harmful acts. As the full statement above makes clear, "significant adversary capability may arise without sufficient warning from the intelligence community." Banks do not await intelligence information that a particular individual or group is planning a robbery at their branch before locking up their funds in safes. Furthermore, despite the explicit Iranian threat in June 1987 that it might arrange for U.S. nuclear facilities to be attacked, the NRC still took no action to protect its facilities.)

In short, the capabilities of terrorists have greatly escalated, restraints on their actions have evaporated, the size of the risk (both frequency of incidents and magnitude of casualties) has substantially increased, the information readily available to potential terrorists is much more extensive, and the ability to protect facilities (via sufficient warning) has become non-existent. Groups clearly have the capability of working in teams undertaking simultaneous, coordinated actions and using weapons and explosives more lethal than those that can merely be carried by hand. The threat has changed, but the design basis hasn't.

Despite clear evidence that the design basis threat assumptions established a decade ago are dangerously outdated, the NRC has not revised them. This inaction is despite statements by the Commission, when the regulations were adopted, that the level of protection they were requiring then was "adequate and prudent at this time" (emphasis added) and a recognition that new facts could arise or the underlying assumption change with time. In fact, the Commission promised:

The kind and degree of threat and vulnerabilities to such threats will continue to be reviewed by the Commission. Should such reviews show changes that would dictate different levels of protection the Commission would consider changes to meet the changed conditions.

42 FR 10836, February 24, 1977

A useful case study by which to measure the Commission's performance with regards to this pledge and its performance of its regulatory duties is the way it has dealt--or not dealt--with the truck bomb threat. Documents obtained under the Freedom of Information Act reveal a troubling picture of the inner workings of the NRC on this important matter.

Case In Point: The Truck Bomb Problem

Overview

In mid-1983, as part of the NRC's semi-annual Design Basis Threat Review, it was recommended that the threat statement in 10 CFR 73.1 be changed to "encompass the use of vehicles by an adversary." This concern was generated by the use of such vehicle bombs against U.S. installations abroad. A formal recommendation to change the design basis threat to include weapons or explosives that may be carried in vehicles was made on January 19, 1984 [Memorandum, McCorkle to Burnett], and on January 27 Burnett directed the development of an immediately effective rule consistent with that recommendation. This immediate action was called for because of the urgency surrounding the rash of such attacks worldwide. A timetable for the rulemaking was established that would have the rule package forwarded to the Commission by June 11, 1984. However, subsequent to the time it was decided to move forward expeditiously, Burnett and McCorkle agreed "to defer action" on the proposed rulemaking, pending the results of research as to the potential effects of vehicle bombs directed against nuclear power plants [see Burnett to McCorkle memo, April 26, 1984]. Rather than move forward in the face of the clear evidence that such weapons could be used by terrorists against American installations, the NRC Staff backed off and decided to study the matter. Meanwhile, all other agencies of government polled by NRC had moved forward expeditiously to deal with the new threat, including DOE for its nuclear facilities. A few blocks from NRC headquarters, at the White House, concrete blocks were put up to deal with potential truck bombs. The Secret Service did not wait for indications "that such a threat existed in the domestic arena"--they took precautionary steps in case such a threat, which clearly existed abroad directed at American installations, might move here. So did all the other agencies NRC polled. Nuc NRC Staff reversed

itself, deferring action pending the results of research it had initiated into possible effects of truck bombs against reactors, results which, ironically, had come in two weeks earlier, with rather frightening conclusions. Four years later the NRC remains the only comparable agency with no response to the truck bomb threat.

Basing security at power reactors on a defined maximum threat of a very small group with only those explosives they can hand-carry [10 CFR 73.1] leaves those facilities highly vulnerable to vehicular bombs. This omission was not, however, an oversight. The original proposed security regulations had included a provision requiring "appropriate barriers" to obstruct ready access by ground vehicles, but it was explicitly deleted from the final regulation on the following basis:

The Commission has decided that this proposed provision should be further studied before being considered for inclusion in the regulations. This proposed amendment has been deleted from the rule....

Whether those studies were ever conducted is unclear. What is clear, however, is that 10 years later the NRC security regulations still require protection only against a small group of adversaries on foot, despite a marked rise in international terrorism, including acts against nuclear targets. This case study provides interesting insight into the failure of the regulatory process to come to grips with serious problems.

The Beirut Truck Bombings

A mounting series of truck bombings directed at American installations in the Mideast led the issue to be taken off the backburner at NRC in early 1984, with considerable urgency. In a press release at the time, the NRC noted the

--publicized events where U.S. installations overseas have been the target of terrorists using vehicle bombs and the Executive Branch's recent announcement that security precautions at certain government facilities in this country have been upgraded as a result. [NRC] Licensees currently are not required to protect against such attacks....

As a matter of prudence, the staff is reviewing this matter on a continuing basis to ensure that security requirements provide for the continued protection of the public health and safety. (emphasis added)

The review by NRC safeguards staff concluded that the regulations needed to be changed, and fast. They directed the development of

...an immediately effective rule which revises the design basis threat for both radiological sabotage and theft to include the introduction by an adversary of explosives and other equipment by vehicle....

Because of the urgency of the situation, the rule was to be written in the shortest possible time and to go into effect immediately upon publication, without the usual delays associated with normal rules. At the same time, the NRC contracted with Sandia National Laboratory to study the potential damage that truck bombs of various sizes could cause at various distances from a power reactor.

Three months later, on April 26, 1984, all action on the proposed rule was deferred, "pending the results of research." However, those research results had actually been provided to the NRC two weeks earlier. A review of those research findings raises troubling questions about the manner in which the NRC has tended to deal (or not deal) with difficult terrorism problems.

The task the NRC gave Sandia was as follows:

Terrorist activity in other parts of the world has exemplified the destructive consequences of an explosives-laden vehicle, i.e., a truck used as a weapon against a facility. Given this threat, the NRC seeks to evaluate the potential vulnerability of nuclear facilities in this country against such action, to determine the "worst case" potential consequences, and to develop easily implemented, cost-effective safeguards mechanisms for preventing

facility access of such a vehicle.

(emphasis added)

On April 13, 1984, the NRC was provided the results of the Sandia study. As the staff subsequently reported to the Commissioners:

The results show that unacceptable damage to vital reactor systems could occur from a relatively small charge at close distances and also from larger but still reasonable size charges at large setback distances (greater than the protected area for most plants).

Why did the NRC, which had, before receiving these research results, initiated an urgent rulemaking to address the truck bomb threat, suspend action on the matter only two weeks after these extremely disquieting results came in? Its action might be easier to understand had the sequence of events been reversed: e.g., a January 1984 decision to commence research to see whether truck bombs could cause serious damage to a reactor, with action suspended pending the research results, followed by a subsequent decision to go ahead with an urgent rulemaking to address the problem when the research indicated the threat was a serious one. It is hard, however, to comprehend why, if the NRC viewed the truck bomb threat as sufficiently serious to commence an immediate rulemaking before the research findings were available, it called off action when the study's conclusions confirmed one's worst fears.

An explanation for this strange state of affairs can perhaps be found in the original direction the NRC provided to Sandia. As cited above, the NRC gave Sandia three research tasks: (1) evaluate the vulnerability of US nuclear facilities to a truck bomb attack, (2) determine the potential consequences of such an attack, and (3) develop easily implemented, non-costly mechanisms for preventing access of explosive-laden vehicles.

Sandia's research produced unpleasant findings regarding each of the questions posed. It concluded that nuclear facilities in this country are

extraordinarily vulnerable to truck bomb attacks; that such an attack could result in "unacceptable damage"; and that addressing the problem would involve more than just a few concrete flower pots or barricades near the reactor, due to Sandia's extraordinary finding that "unacceptable damage to vital reactor components" could result even if the truck bomb were detonated off-site! Thus, the problem was graver than previously thought (and therefore more needy of prompt action) while at the same time requiring more expensive corrective measures (and therefore likely to be resisted more vigorously by licensees.)

As members of the Advisory Committee on Reactor Safeguards (ACRS) have pointed out, there is a difference between NRC and other Federal agencies which had already taken measures to protect against truck bombs (including the DOE for its reactors). That difference can help explain why the NRC is the only comparable Federal agency not to have taken domestic precautions against truck bombs. The expense of the security measures adopted by the other agencies was borne by the taxpayer, whereas if NRC expanded its design basis threat regulations to require protection against vehicular bombs, the added security costs would have to be covered by the utilities which owned the nuclear facilities. Here is a unique situation where the level of protection at a nuclear facility is determined by who owns it rather than by how many people could be hurt by failure of its security.

So long as the proposed NRC truck bomb rule involved only a few extra concrete barricades on-site, the cost to the licensees would have been minimal and the political cost to the NRC acceptable. When research revealed that the problem was considerably more serious than previously thought, and the solution therefore more expensive, the regulatory agency apparently felt it could not "afford" to require action proportionate to the problem.

This situation raises the peculiar paradox of contemporary regulatory agencies such as the NRC with regard to large problems such as the risk of nuclear terrorism. As long as the problem is small, and the solution not costly to those being regulated (and thus not politically costly to the agency doing the regulating), the agency feels it can act. However, should the problem turn out to be major, involving significant risks to the public, and the solution therefore consequential in terms of costs to the licensees, the agency comes under substantial internal and external pressure to leave the problem unattended, hoping that it will go away on its own.

Thus, ironically, it is only those links in the security chain which are already relatively strong that the Commission feels it can address, because they are inexpensive, both economically to the licensees and politically to the agency. The weak links, such as vulnerability to truck bombs, remain "deferred pending further study." Yet it is, of course, the weak links that create the bulk of the risk to the public and to the nuclear industry itself.

Conclusions

- (1) The NRC's design basis threat regulations for power reactors are outdated, dangerously so.
- (2) There is a major contradiction in NRC's proposal to revise the design basis threat for fuel cycle facilities, including consideration of use of vehicles, but failing to take similar action for reactors.

Recommendations

- (1) 10 CFR 73.1 should be revised to include use of vehicles by attackers, both to transport the attackers and their weapons and as a vehicular bomb.

(2) 10 CFR 73.1 should be revised to include a larger group of external attackers, capable of acting as more than one team, using weapons more advanced than just hand-carried automatic rifles.

(3) 10 CFR 73.1 should be revised to include consideration of more than a single insider. Note that there have already been a number of incidents in which sizable groups of insiders at nuclear facilities have been arrested and charged with felony conspiracy for illegal drug transactions; why it is presumed that no more than a single insider would be involved in other kinds of illegal activity is difficult to justify.

(4) Repeal the 10 CFR 50.13 prohibition of consideration of protection against attacks by "enemies" of the United States. In this era of state-sponsored terrorism, such a regulatory prohibition makes no sense.

(5) Alter 10 CFR 73.55(h)(3) to require an armed guard force considerably in excess of five. It is hard to take reactor security seriously with such a regulatory standard of sufficiency.

(6) Address the attitude and regulatory process problems that have permitted such an outdated group of security regulations to remain unchanged for over a decade, despite the rapid escalation in terrorism throughout the world.

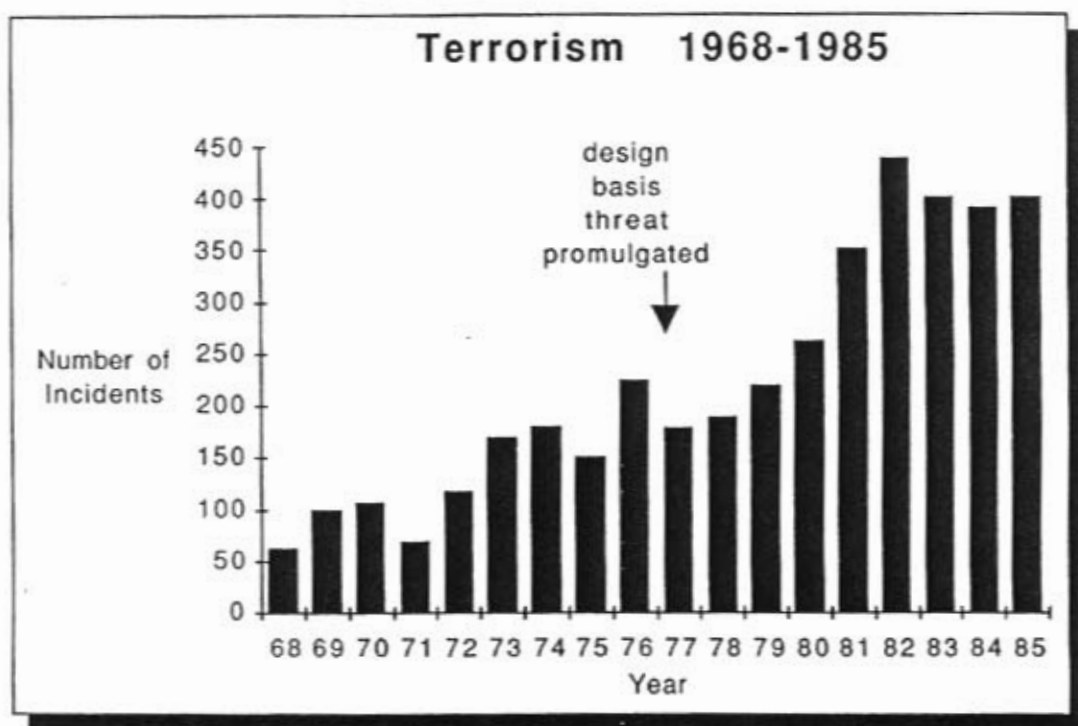


Chart: Stephen Schwartz

Source: RAND Corporation Data

Figure 1

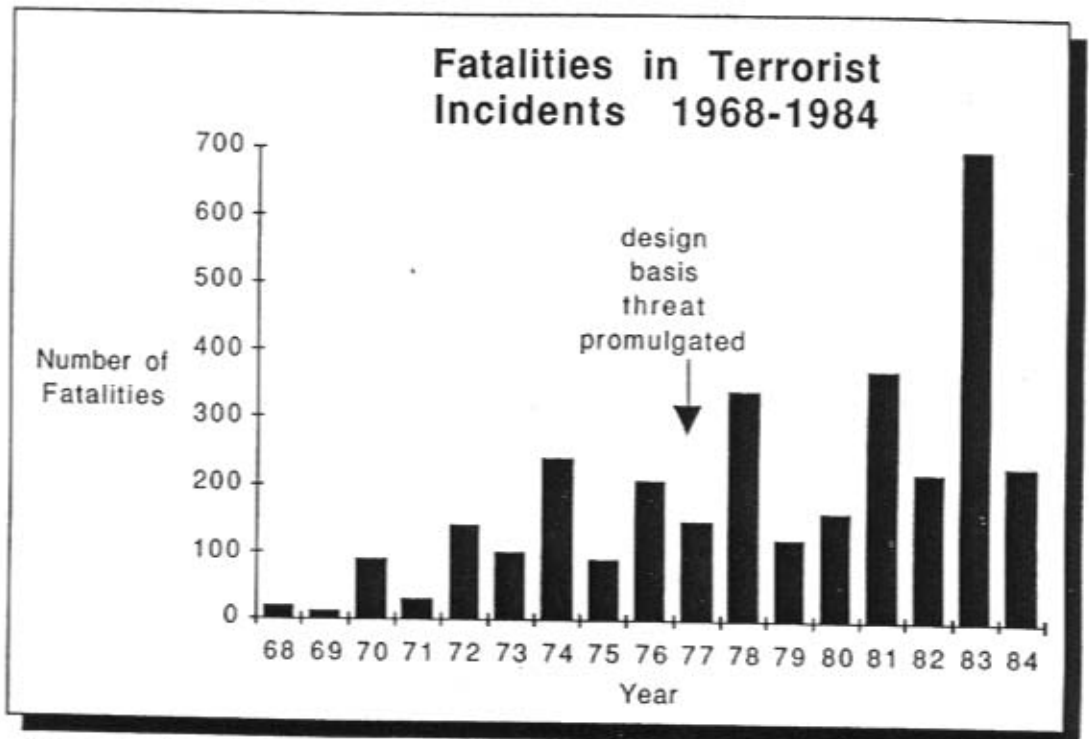


Chart: Stephen Schwartz

Source: RAND Corporation Data

Figure 2

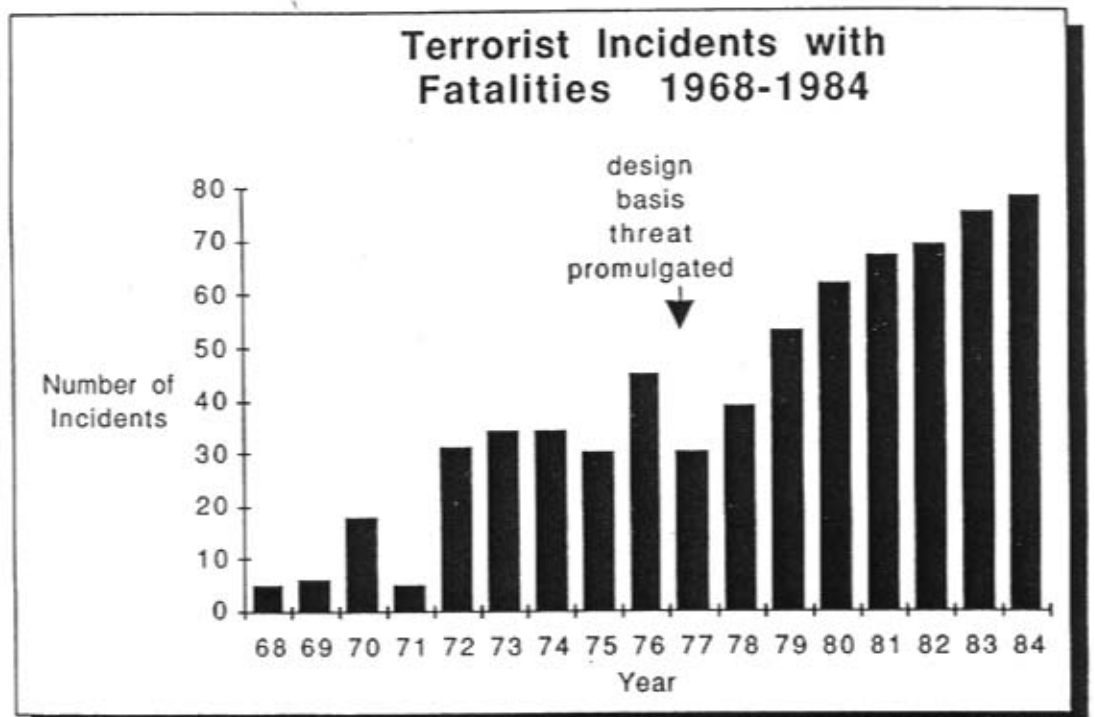


Chart: Stephen Schwartz

Source: RAND Corporation Data

Figure 3

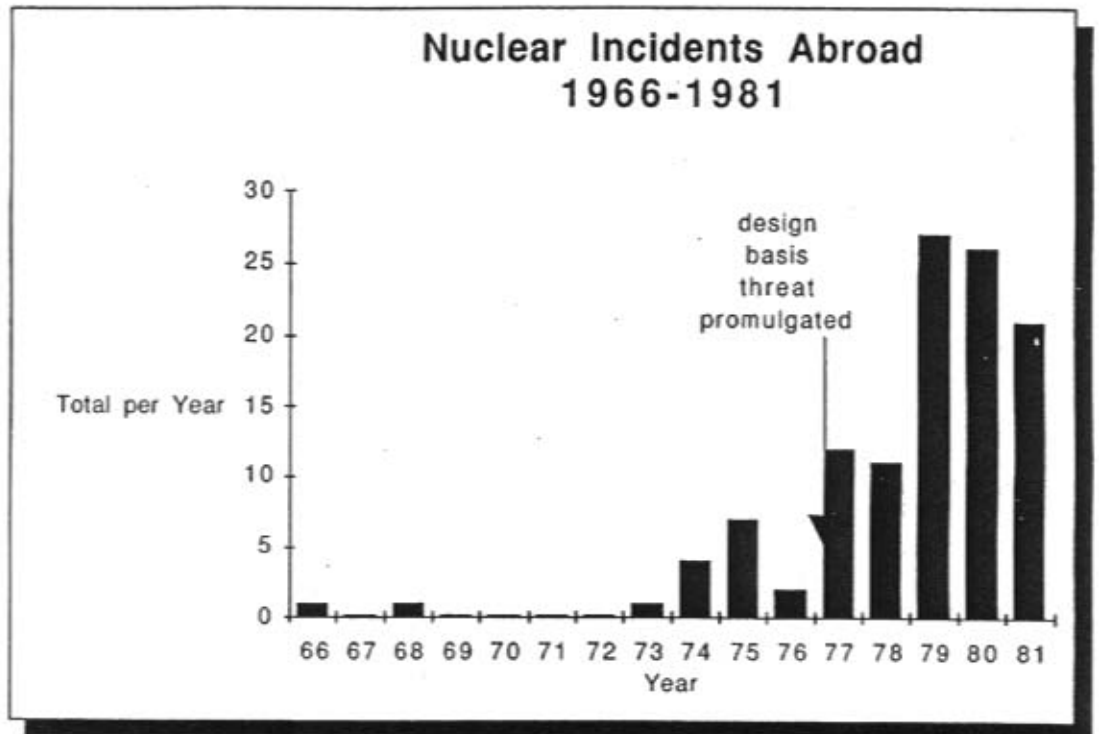


Chart: Stephen Schwartz

Source: RAND Corporation Data

Figure 4

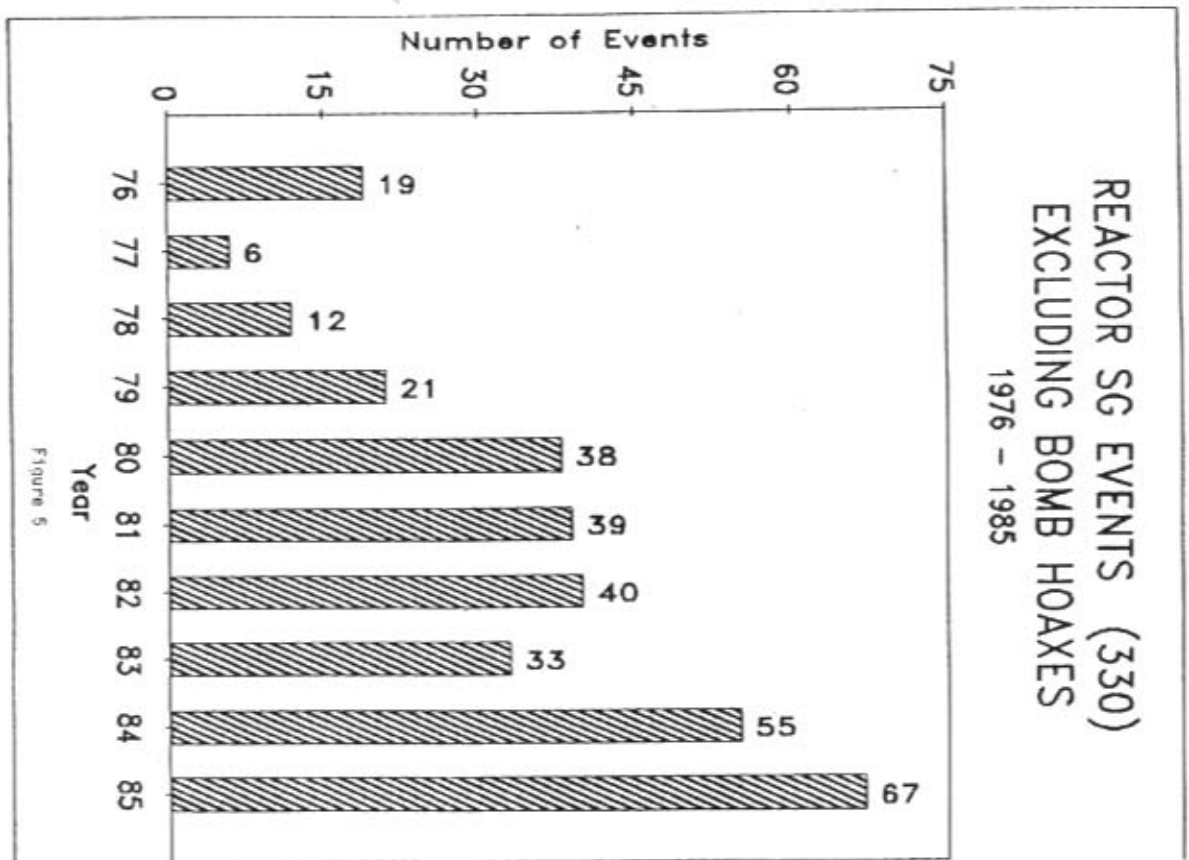


Figure 5

TAMPERING/VANDALISM EVENTS (69)

1976 - 1985

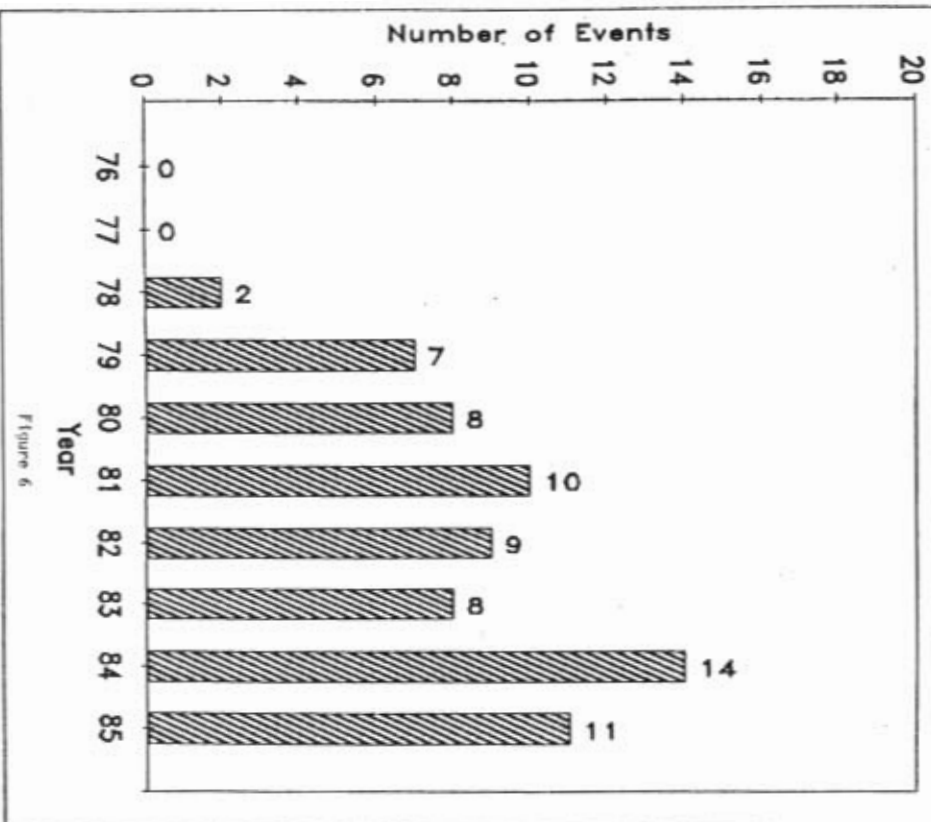


Figure 6

Attachment I

Daniel Hirsch
Recent Work in the Nuclear Policy Area

I have specialized in nuclear non-proliferation, nuclear safeguards, nuclear safety, nuclear terrorism, and nuclear regulatory issues, among other matters. A few examples of my recent work: My study, "The Truck Bomb and Insider Threats to Nuclear Facilities," prepared for the International Task Force on Prevention of Nuclear Terrorism, was published earlier this year in Leventhal and Alexander, eds., Preventing Nuclear Terrorism (Lexington, Mass.: Lexington Books, 1987). In June, I completed a study entitled "Consideration of Severe Accident Uncertainties in Radiological Emergency Response Plan Development," prepared for the Institute for Resource and Security Studies and Clark University's Center for Technology, Environment and Development, under the sponsorship of the three Mile Island Public Health Fund, the court-established fund established after the TMI accident. My research over the last several years regarding the policy aspects of reducing proliferation and nuclear terrorism risks by substituting low-enriched fuels for the weapons-grade, highly enriched uranium (HEU) used in certain types of reactors is said to have contributed to the recent decision by the U.S. Nuclear Regulatory Commission to require the conversion of most of its HEU-fueled reactors to use of material which, if stolen, can't be used to make a nuclear explosive.

Last year I served on a Nuclear Regulatory Commission panel established to help develop containment performance design objectives for U.S. commercial nuclear reactors. I currently serve on a joint panel of the Federation of American Scientists and the Committee of Soviet Scientists analyzing verification issues associated with potential deep cuts in U.S. and Soviet nuclear arsenals.

12/87