

Work Plan Outline

Task Group 6: *Conclusions and Recommendations*

6.1. Introduction

Conclusions and recommendations will be based on the conclusions and recommendations from the group research. The conclusions will be compared with existing national and international standards. What follows is an outline of research so far on those standards.

This outline is based on 3 generalized hypothetical threats in the original outline presented to NATO : 1) Attack on NPP by aircraft; 2) Attack on spent fuel storage at an NPP by several truck bombs, 3) Attack on spent fuel transport by rocket propelled, remote-controlled grenade or several truck bombs.

This outline refers to one national standard for physical protection, the US Nuclear Regulatory Commission (NRC) regulations (10 US Code of Federal Regulations, part 73), and one international standard, the recommendations of the International Atomic Energy Commission (IAEA Information Circular 225, Revision 4 or INFCIRC/225/Rev.4, 1949). Our conclusions will not be restricted to these standards. We have been advised that there are no Euratom standards for physical protection as there are for reactor safeguards, i.e., material accounting and control. We intend to check British, French and German regulatory standards as well as international recommendations from, for example, the Basic Safety Standards agreed by the IAEA and other international organizations. In addition, we will check relevant standards of non-governmental national and international organizations such as ASTM.

What follows is a brief discussion of the possible application of the IAEA and NRC standards to three generalized scenarios that relate to the more detailed scenarios we will be discussing in the final report.

6.2. Attack on NPP by aircraft

There are no IAEA recommendations or public NRC Design Basis Threat (DBT) requirements or rules designed to deal with air attacks on NPPs. The NRC is studying what reactor operators might be required to do, but its public statements indicate that probably no major new requirements to deal with this threat will be imposed on operators because dealing with it is regarded as the federal government's responsibility.

Some years ago there was a Sandia National Lab experiment using a fighter aircraft which crashed into a mock reactor wall, and would not have caused damage to the reactor if one had been behind the wall. An NRC safety study (WASH 14) concluded that a Boeing 707 crashing into a reactor would probably not cause radioactive releases from the reactor itself.

Some of the defenses against possible new terrorist attacks like those of 11 September have included anti-aircraft guns and fighter aircraft patrols to guard reactors. The former have been used in France, Russia and some East European countries. The latter have been used in many countries but are usually considered only after an intelligence alert suggests that an attack may happen soon.

The IAEA is considering whether to recommend new protection standards against aircraft attack. There is now nothing directly relevant to an 11 September sort of aircraft attack in either of the two existing international documents intended to improve national standards—the Convention on Physical Protection of Nuclear Material and IAEA Information Circular 225, Revision 4 (1999).

6.3. Attack on spent fuel storage at an NPP by several truck bombers

6.3.1. IAEA

If sabotage of stored spent fuel would lead to “unacceptable radiological consequences,” IAEA INFCIRC 225/ Rev. 4 (1999) recommends that the spent fuel be located in a “vital area” which is within a “protected area” of an NPP. The outer protected area should be surrounded by a “physical barrier” which in turn should be surrounded by a “cleared area” – cleared because it should be under the surveillance of guards. If possible, the vital areas should have only one entrance-exit. INFIRC/225/Rev.4 recommends that the protection barriers provide “penetration delay” and be “appropriately secured and alarmed when unattended.” “They should be appropriately protected to ensure that they are not malevolently used.” All vehicles entering the protected area should be subject to search using explosive detectors. Private vehicles should be excluded from the vital area but not necessarily from the protected area.

These recommendations seem inadequate to deal with several truck bombers. The first bomber could probably knock down the outer fence and perhaps crash the barrier for the inner area—quite possible putting a hole through it big enough for a second and then a third truck. The second and third truck bombers could probably get to the places where spent fuel is stored and perhaps to the cooling system or auxiliary generator of the reactor. Even if the truck bombers were not able to produce releases from the reactor itself, it is possible that they could do so from the dry spent fuel storage building or the spent fuel pool.

6.3.2. NRC

The NRC regulations provide a DBT for NPPs that includes one four-wheel-drive vehicle used to carry up to three terrorists with hand-carried weapons and a truck bomb. These three may have the assistance of one insider. NPP licensees with need for dry storage for their spent fuel because the spent fuel pond is full must build a new, above-ground dry storage building which has wall barriers and “large steel or concrete casks” for the dry spent fuel. Both this and the spent fuel pool are likely to be more vulnerable than the reactor itself.

Since NRC requirements for protection are based upon the above DBT and the threat we are postulating is two or three trucks with terrorists aboard, the NRC requirements appear insufficient.

6.4. Attack on spent fuel transport by rocket-propelled, remote-controlled grenade or several truck bombs.

6.4.1. IAEA

In general, spent fuel should be transported in “closed, locked vehicles, compartments or freight containers.” INFCIRC/225/Rev.4 (1949). However, spent fuel packages “weighing

more than 2000 kg that are locked and sealed” are permitted in “open vehicles.” The transportation route should not be communicated to those not needing to know it, the route should not go through areas of “civil disorder,” and it should depend in part on the capabilities of the response forces, including those along the route.

Based on the discussion in earlier chapters, these recommendations do not seem sufficient to prevent, for example, anti-tank weapons from penetrating spent fuel casks in open truck transport and from causing release of some radioactivity to the environment. The amounts of radioactivity will of course depend on both the weapons used and the protective containers provided.

6.4.2. NRC

The regulations of NRC contain no Design Basis Threat (DBT) for transportation of spent fuel from NPPs. They do contain a statement of performance objectives for such transport. For example, the goal should be to “minimize the possibilities of radiological sabotage.” (Sec. 73.37 (1)(i) of 10 CFR). The “objectives” statement emphasizes the importance of this goal in “heavily populated areas.” The objectives call for a pre-shipment assessment of attempts to gain unauthorized access and the rules require pre-notification of response forces and for preparation of plans to “impede attempts at radiological sabotage.”

The rules require advance NRC permission for all routes, notification of local law enforcement officials of times and routes, and escorts to stay with the shipments at all stops (for meals or overnight). (Notification to all local law enforcement officials for a route crossing the US would probably include many hundreds of people.)

If the movement is by road in a heavily populated area, the transport vehicle must be occupied by at least two persons, and led by another vehicle with an armed escort. There are various communication requirements to provide notification of location of the vehicle while en route.

These regulations are for trucks. There are separate provisions for rail or water shipment.

These regulations provide useful goals but inadequate guidance to spent fuel shippers to deal with the threats we have posed. We recommend using the well-supported NRC practice of stating a DBT for guidance of operators, in this case for guidance of fuel shippers. That usually gives the regulated industries better guidance than regulations, but should be followed by revised regulations to deal with the threat we have postulated.