

Nuke Kids On The Block:

Can Non-State Actors Carry Out Nuclear Terrorism?

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Summary: Non-state actors pose a nuclear terrorist attack risk to the United States. While the complexity of obtaining and/or fabricating these devices severely limits the potential of a non-state group to carry out nuclear terrorism, the risk still needs to be assessed in a systematic manner even if the intelligence on terrorist groups is limited and the assessment must be taken with some speculation. In order to effectively assess the capability of a non-state actor carrying out nuclear terrorism, the benefits and consequences of a nuclear attack against the US for the group, the possible routes through which a group can obtain a nuclear device or the materials, and the technical challenges behind the construction of a deliverable nuclear device must all be evaluated on a case by case basis, even if the risks are low for most or almost all non-state groups.

I: Why terrorists want big bombs.

A nuclear terrorist attack would cause mass destruction and panic. Crude nuclear devices are estimated to have a yield of a few kilotons. This destructive capability of nuclear devices is the biggest motivation for terrorist groups.

These devices have both immediate and prolonged effects. Immediate effects include destruction of property, loss of life through prompt radiation and heat, and interruption of basic infrastructure. Prolonged effects include the radioactive fallout that contaminates the nearby food production and water, denial of area through radioactive contamination, and economic impact from the destruction of property.

Terrorist groups want a nuclear attack for psychological reasons. Nuclear devices psychologically affect the targets of the attack as well as the circles the group operates in. Terrorists may be interested in the message the nuclear attack sends to their intended audience as well as other terrorist groups.

Targets can have many psychological responses to the attack. Depending on the severity and response to the attack, some individuals may lose confidence in societal institutions. A loss of infrastructure and denial of area may undermine the public's perceived safety and produce fear. Other terrorist groups who witness the attack may in turn be intimidated. The nuclear terrorist group may then see this as a way to ascertain its strength and rhetoric to other, possibly conflicting, groups.

II: The nuclear market: obtaining a device.

Terrorists could purchase or steal a nuclear device from a state. Such method of acquisition would ensure the device would work as desired. There is some fear that some munitions lost during the Cold War may still be unaccounted for and could be up for purchase. The drawback of this approach is that most military weapons are large and hard to deliver due to their high yield. Cold War era

munitions may no longer be fully functional due to material stresses and aging from radioactive decay making them untrustworthy.

Terrorists could buy or fabricate the parts for a nuclear device. This device would be less sophisticated and lower yield than a military device. Terrorists would need fissile material, high explosives, and firing mechanisms to construct said device.

Fissile material can be either highly enriched uranium (HEU) or plutonium. Obtaining HEU is very difficult for states, even more so by non-state actors. The International Atomic Energy Agency (IAEA) strictly regulates HEU production and stockpiles. If a state were to sell or lose some of this HEU, the international community would be alerted. The production of HEU requires a lot of money and time and very specific facilities to which terrorists may not have access. Plutonium production is also monitored by the IAEA, but slightly harder to monitor. While it may be difficult for a state to sell the material to a terrorist group, it is more feasible for a terrorist group to steal it from a reprocessing facility.

High explosives and firing mechanisms are regulated materials. These materials fall under export controls and are expensive. Some of these materials do have dual use in mining and specific types of construction so a terrorist group could obtain them through theft or purchase.

III: Instructions not included: building the bomb is hard.

Nuclear devices are intricate and difficult to construct. Crude nuclear devices are unreliable and relatively low yield. HEU and plutonium weapons each have their advantages and their constraints. Terrorist groups would have to overcome several design challenges before having a detonable and deliverable weapon.

Design wise, HEU devices pose the biggest threat. A gun type HEU device could be assembled, sans HEU, with minimal detection. The parts are easily accessible and the design is rather simple. HEU is so volatile that if two masses of it collide against one another, a small detonation could occur. What minimizes the risk of this type of weapon is the acquisition of HEU. As mentioned before, HEU is very controlled and safeguarded. This device would also weigh several hundred kilograms making the delivery somewhat of a challenge. Even if a group obtained HEU metal, the fissile properties depend on the geometric shape of the HEU. These dimensions are not readily available or intuitive for terrorist groups.

Plutonium devices have bigger yields, but are harder to make. While plutonium from civilian reactors could be used to fabricate a weapon, due to the nuclear properties of plutonium a faster compression rate of the fissile material is needed. While plutonium requires less mass for criticality, the device tends to be more complex. If the geometric design of the fissile material and the high explosives used for compression are not precise enough, the device will have a fizzle yield and detonate prematurely. It should also be noted that civilian grade plutonium is also heavily contaminated with Plutonium-240, which could create a premature critical mass and a fizzle yield adding another layer of complexity to the device assembly.

These challenges make the construction and acquisition of a nuclear device difficult. Until a terrorist group can overcome them, nuclear weapons will continue to be out of their range.