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Technology of 'Dirty Bomb' Simple, but Not the Execution

By *Guy Gugliotta*
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Finding enough radioactive material to make a "dirty bomb" might be relatively easy, experts say, but the effects of such a weapon could never remotely approach those of a nuclear explosion.

"The nuclear device is a weapon of mass destruction," said nuclear scientist Siegfried Hecker, former director of the Los Alamos National Laboratory. "Dirty bombs are weapons of mass disruption, in terms of frightening people, the cleanup and the potential economic consequences."

Interest in dirty bombs has deepened recently among U.S. intelligence officials because of mounting evidence that Osama bin Laden and his al Qaeda network may be developing expertise in building them.

But Homeland Security Director Tom Ridge said yesterday that U.S. authorities had no information that bin Laden had made such a weapon. Ridge added that the Bush administration's latest anti-terrorist alert had nothing to do with the threat of a dirty bomb. Sources have told The Washington Post that concerns about al Qaeda's nuclear capabilities had played a role in the alert.

The technology to make the bomb is relatively simple: Find some radioactive material, wrap it around a core of ordinary high explosive and detonate it so that contamination spreads over the widest possible area.

This is not a nuclear explosion. That occurs when two subcritical masses of highly processed radioactive material are thrust suddenly together, triggering a violent chain reaction and release of energy.

Blast effects and heat from a nuclear device can flatten city blocks and kill thousands of people; the only blast from a dirty bomb is provided by the explosive.

Still, while fatalities may be light, a dirty bomb can cause a higher incidence of cancer in local residents even decades after the attack, and more immediately, provokes the same psychology of fear as a chemical or bioweapons threat. In that respect, Hecker said, a dirty bomb "would have an instant terrorist effect."

But the bomb-maker must always contend with a Catch-22, for the more powerful the radiation source, the more dangerous it is to handle. The weaker the source, the less damage the weapon will cause.

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"The dirtiest spent fuel is from a nuclear reactor," said Lisbeth Gronlund, senior staff scientist of the Union of Concerned Scientists. "It is very radioactive, and one reason to consider it proliferation-resistant is that the dose you get from stealing it would kill you pretty quickly."

Even if the thief is prepared to die, making bombs from "hot" radioactive material and getting them to the target present dangers. "How do you figure out how much you need?" asked Tom Cochrane, nuclear program director for the Natural Resources Defense Council. "And how do you transport it?"

The alternative is to pick a weaker radiation source. That means using plutonium or enriched uranium, which give off "alpha" particles that cannot penetrate the human body from outside, unlike the "gamma" particles or neutron radiation common in spent fuel waste or cobalt-60.

If the terrorist chooses alpha, then the plutonium must be milled fine, like anthrax spores, because the only way it can hurt humans is through inhalation, Cochrane said. This adds another requirement for technical expertise. But as long as the maker can deal with the radioactivity, detonating the device is as easy as triggering a bomb in a car or arming it from the air.

Damage could be problematic, experts say. In October, the nonprofit National Council on Radiation Protection and Measurements estimated that contamination would spread over "only a small area of a few city blocks."

The International Physicians for the Prevention of Nuclear War argued that a plutonium dirty bomb would have almost no immediate health consequences, and even though it could lead to cancer years after the attack, the effects "would probably not be dramatic."

Still, the terrorist group that used a dirty bomb would garner immense prestige among its peers, said British political scientist Gavin Cameron in a paper prepared last month for the International Atomic Energy Association, and "the mere fact of being nuclear would almost certainly ensure that it had a considerable impact on the public's imagination and fear."

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