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OP-ED CONTRIBUTOR

The Smoky Bomb Threat

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THE exotic murder-by-polonium of the former K.G.B. spy Alexander Litvinenko has embroiled Russia, Britain and Germany in a diplomatic scuffle and a hunt for more traces of the lethal substance. But it also throws into question most of the previous analyses of "dirty bombs," terrorist attacks using radioactive isotopes wrapped in explosives (or using other dispersion techniques) to spread radioactive material in crowded areas.

Essentially all analysts, myself included, played down the possibility of using alpha radiation — fast-moving helium nuclei ejected during the radioactive decay of certain isotopes, such as of polonium 210, the substance that killed Mr. Litvinenko — as a source of dirty bombs. We concentrated instead on isotopes that emit penetrating gamma rays, which are basically super-powered packets of light, hard to shield and effective at a yard or more.

The alpha radiation from polonium can be easily shielded — by a layer of aluminum foil, a sheet or two of paper, or the dead outer layer of skin. And so, the reasoning went, alpha radiation could not hurt you as long as the source stayed outside your body. Exactly. Mr. Litvinenko was apparently killed by polonium that he ate or drank or inhaled. That source was so physically small that it was hard to see, perhaps the size of a couple of grains of salt and weighing just a few millionths of a gram.

Dirty bombs based on gamma emitters, analysts have learned, can't kill very many people. Mr. Litvinenko's death tells us that "smoky bombs" based on alpha emitters very well could.

Polonium 210 is surprisingly common. It is used by industry in devices that eliminate static electricity, in low-powered brushes used to ionize the air next to photographic film so dust can be swept off easily, and in quite large machines placed end-to-end across a web of fabric moving over rollers in a textile mill. It is even used to control dust in clean rooms where computer chips and hard drives are made.

It may be difficult to get people to eat polonium; it isn't hard to force them to breathe it. The problem for a radiological terrorist is to get his "hot" material inside people's bodies where it will do the most harm. If the terrorist can solve that problem, then alpha radiation is the most devastating choice he can make. Precisely because alphas emit their nuclei so quickly, they deposit all of their energy in a relatively small number of cells, killing them or causing them to mutate, increasing the long-term risk of cancer.

The terrorist's solution lies in getting very finely divided polonium into the air where people can breathe it. Without giving away any information damaging to national security, I see several fairly simple ways to accomplish this: burn the material, blow it up, dissolve it in a lot of water or pulverize it to a size so small that the particles can float in the air and lodge in the lungs.

It would be unwise for me to dwell on the details of just how one goes about getting a hot enough fire or breaking polonium into extremely fine "dust." In the end, however, the radioactive material will appear like the dust from an explosion, or the smoke from a fire. My point is to demonstrate the urgent need for new thinking in the regulatory arena, not to give away important information.

Air containing such radioactive debris would appear smoky or dusty, and be dangerous to breathe. A few breaths might easily be enough to sicken a victim, and in some cases to kill. A smoky bomb exploded in a packed arena or on a crowded street could kill dozens or hundreds. It would set off a radiological emergency of a kind not seen before in the United States, and the number of people requiring life support or

palliative care until death would overwhelm the number of beds now available for treating victims of radiation. First responders dashing unprotected into the cloud from a smoky bomb might be among the worst wounded. Fire and police departments around the country will need alpha radiation detectors, since the counters they carry now cannot see alphas.

Some of the steps involved with making a good smoky bomb from polonium would be dangerous for the terrorists involved, and might cost them their lives. That, unfortunately, no longer seems like a very high barrier.

What can we do to stop them? We must make it far less easy for them to acquiring polonium in deadly amounts. Polonium sources with about 10 percent of a lethal dose are readily available — even in a product sold on Amazon.com. Only modest restraints inhibit purchase of significantly larger amounts of polonium: as of next year, anyone purchasing more than 16 curies of polonium 210 — enough to make up 5,000 lethal doses — must register it with a tracking system run by the Nuclear Regulatory Commission. But this is vastly too high — almost no purchases on that scale are made by any industry.

The commission (and the International Atomic Energy Agency as well) is said to be considering tighter regulations to make a repeat of the Litvinenko affair less probable. There is talk that it might tighten the polonium reporting requirement by a factor of 10, to 1.6 curies. That's better, but still not strict enough.

The biggest problem is that the regulatory commission's regulations do not restrict the quantity of polonium used in industry. This may make it quite easy for terrorists to purchase large amounts of one of the earth's deadliest substances. A near-term goal should to require specific licensing of any person or company seeking to purchase alpha sources stronger than one millicurie, about a third of a lethal dose. A longer-term goal ought to be eliminating nearly all use of polonium in industry through other technologies.

That is a technical challenge and would cost some money, but it would certainly be less expensive than coping with the devastation of a smoky bomb.

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