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The Likely Effect of a Radiological Dispersion Device

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With the end of the Cold War, the political and strategic relationships that undergirded the global balance of power were shattered. The powers that held nation-states together, like the USSR, Czechoslovakia, Yugoslavia, and others largely disappeared and to fill the vacuum left by the reduction of political authority, nationalist and religious identities emerged strong. As a result, the former USSR has broken into at least thirteen new countries, mostly along historic ethnic lines, Czechoslovakia into two, Yugoslavia, violently, into five along both religious and ethnic lines. These are only the most familiar examples, as there are many more. The threat of this type of strategic and geopolitical change is in the change itself. During this time, most significantly in the former USSR, much of the military hardware was sold off, traded, or stolen, to include radiological materials. (Abraham, 2004; Chuen, 2004).

This missing nuclear materials and its potential for military application, combined with the evolving terrorist threat creates a security concern of some importance. Terrorist groups have made it known that they are searching for nuclear weapons to deploy on U.S. soil (Farah, “Al-Qaeda’s U.S. targets”, 2005; Linzer, 2004). The easiest type of nuclear device for terrorist groups to assemble is what is called a Radiological Dispersion Device (or RDD), and is often referred to as a “dirty bomb” (Blair, 2001; Federal Emergency Management Agency [FEMA], 2005).

According to the U.S. Department of Defense, an RDD is "any device, including any weapon or equipment, other than a nuclear explosive device, specifically designed to employ radioactive material by disseminating it to cause destruction, damage, or injury by means of the radiation produced by the decay of such material” (Ford, 1998). An RDD is typically a conventional explosive combined with some type of radiological material. It is not a nuclear
device and is not a Weapon of Mass Destruction (WMD), but rather, as researcher Peter Probst calls it, a “weapon of mass disruption” (Hughes, 2002). In fact, effective dispersal ranges are rather limited. Most deaths (if any) would come from the initial explosion (non-nuclear), but it does depend on the type of radiological material used. (Department of Homeland Security [DHS], 2003).

Typically, an RDD would be used to inflict psychological effects, rather than to achieve a military or strategic goal. A military use might be “area denial,” where an RDD is employed to contaminate an area to dissuade an enemy force from occupying that area (Schopfer, n.d.). The psychological effects (anticipation, fear, over-reaction, preparation costs, etc.) are much more effective than actual use, hence the appeal to terrorist groups (in conjunction with the relative simplicity and low-costs).

As conventional uses for an RDD are rather limited, and other more conventional weapons could perform similar tasks, conventional militaries are not likely to employ them. It is more probable that terrorist organizations or other extremists, rather than nation-states, would seek to manufacture and utilize RDDs, as mentioned above, because of the relative production costs, and effects on a population. Local, state, and national governments worldwide have to purchase detection equipment, as radiation is not detectable with the senses; additionally, developing plans to fight proliferation, to coordinate emergency response, training, and plans to secure and implementation of security of stockpiles and nuclear waste materials are only some of the financial costs inflicted with a threat to use an RDD.

quoted in Coella, Thompson, Macintosh, and Logan, 2005) offer the following chart detailing the
most dangerous isotopes, their common uses, primary form, half-life, and emissions types.

**Commercial Radioactive Sources of greatest concern.**

<table>
<thead>
<tr>
<th>Isotope</th>
<th>Common Uses</th>
<th>Primary Form</th>
<th>Half-Life</th>
<th>Emissions Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cesium-137 (Cs-137)</td>
<td>Telemtherapy, blood irradiations, and sterilisation facilities</td>
<td>Solid, chloride powder</td>
<td>30.1 yrs</td>
<td>beta and gamma radiation</td>
</tr>
<tr>
<td>Cobalt-60 (Co-60)</td>
<td>Teletherapy, industrial radiography, and sterilisation facilities</td>
<td>Solid, metal</td>
<td>5.3 yrs</td>
<td>beta and gamma radiation</td>
</tr>
<tr>
<td>Iridium-192 (Ir-192)</td>
<td>Industrial radiography and low dose bracytherapy</td>
<td>Solid, metal</td>
<td>74 days</td>
<td>beta and gamma radiation</td>
</tr>
<tr>
<td>Radium-226 (Ra-226)</td>
<td>Low dose bracytherapy</td>
<td>Solid, metal</td>
<td>1600 yrs</td>
<td>alpha and gamma radiation</td>
</tr>
<tr>
<td>Strontium-90 (Sr-90)</td>
<td>Thermo-electric generators</td>
<td>Solid, oxide powder</td>
<td>28.8 yrs</td>
<td>beta radiation</td>
</tr>
<tr>
<td>Americium-241 (Am-241)</td>
<td>Well logging, thickness, moisture and conveyor gauges</td>
<td>Solid, oxide powder</td>
<td>433 yrs</td>
<td>alpha radiation</td>
</tr>
<tr>
<td>Plutonium-238 (Pu-238)</td>
<td>Heat sources for pacemakers and research sources</td>
<td>Solid, oxide powder</td>
<td>88 yrs</td>
<td>alpha radiation</td>
</tr>
</tbody>
</table>

Russia has large quantities of these isotopes and the volatile nature of the transitional
democracy makes oversight and security difficult. Complicating the matter is the abundance of
radiological materials Russia has been used in minimally secured places, such as in medicine
and nuclear industry (Chuen, 2004). Some Chechens fighting for national freedom from Russia
have used RDDs as recently as 1995, when rebels “placed a 30-pound container of radioactive
cesium in a Moscow park” (Ford, 1998). Chechen rebels also placed an RDD near a railroad in
Argun, Chechnya in 1998. Neither incident involved actual detonation (Coella, Thompson,
Macintosh, & Logan, 2005). There is evidence that Chechen rebels are associated with Al-
Qaeda. Vladimir Putin, after the terrorist attacks of September 11 “blamed bin Laden and his
associates for helping Chechen rebels who have been waging a war of independence inside
Russia for most of the past seven years…” (Glasser and Baker, 2001).
Actual deployment effects are unknown and vary according to type of nuclear material used, but typically RDDs yield only contamination (World Health Organization, 2003). This contamination typically is long-term, and would deny access to geographical areas. This is one reason that major cities have been targeted by Al-Qaeda who reportedly has at least 40 nuclear weapons from the former USSR (Farah, 2005).

The health effects of an RDD explosion (other than initial blast injuries) could include organ and tissue damage, the potential for radiation sickness, cancerous growths, and contamination of food and water supplies, which could then be ingested, further complicating the health crises and spreading the contamination. Depending on the isotope and the amount of material, death from irradiation is a possibility for those closest to the initial blast site (Litman, 2003).

The social and economic effects of attacking a densely populated area, such as New York City and denying access via radiological contamination would be catastrophic, hence the term “weapon of mass disruption”. The personal property costs would be immense; thousands of businesses would bankrupt, employees would lose incomes, manufacturing would cease, prices would rise, and costs to treat personal contamination, treat medically, relocate, and house the affected population would be immense. Contamination could be spread by affected people and by wind, so size, time of day, and wind patterns all contribute to the overall dispersion of the radiation, making preparedness difficult and response less certain. Cleanup alone could take years and costs millions of dollars (Plough, n.d.).

Multiply the above affects by two or three different cities alone, and the looming disaster dwarfs the attacks of September 11, 2001. The potential effects psychologically could include mass hysteria, calls for a police state, and potentially even capitulation to the terrorist demands.
Assuming this type of attack occurred in a coalition nation, withdrawal of support and troops from the “war on terror” could ensue, making the American situation more dire.

In conclusion, terrorist-type groups are the most likely to employ RDDs, but to this point in time have not detonated any. The opportunities to obtain these types of devices, or the materials to manufacture one have been historically prevalent, most notably since the demise of the Soviet Union. There have been more than 500 instances of illicit trafficking in nuclear and radioactive materials that are known about according to the IAEA (as quoted in Coella, et al., 2005). The likelihood of use of one of these devices is high, especially in the United States and other coalition nations. The effects will be dramatic, but it is likely that the U.S. economy will handle the “fallout” similarly to September 11, 2001; a recession may occur, but will regain after a few years. Ultimately, the threat is real, and likely to occur as Al Qaeda operative are already in the country. This is only one more reason that the President should have, and still should tighten the southern border of the United States. “As one Royal Canadian Mounted Police officer familiar with the situation in Mexico said: ‘What’s the point of having old ladies remove their shoes at airport security checks, when all it takes to carry a small package of the potent ricin poison into the U.S. is a friendly Mexican jihadist escorting you on a dark moonless night across the porous U.S.-Mexican border’” (Farah, “Mexico’s blind eye”, 2005).
References


