12-31-2005

The Likely Effect of a Radiological Dispersion Device

Paul R. Rickert
Liberty University, prickert@umd.edu

Running Head: THE LIKELY EFFECT OF A RADIOLOGICAL DISPERSION DEVICE

The Likely Effect of a Radiological Dispersion Device

By:

Paul R. Rickert, M.S., M.C.J.

Assistant Professor of Criminal Justice

Helms School of Government

Liberty University

December 31, 2005

The Likely Effect of a Radiological Dispersion Device

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.

According to Cristina Chuen, research associate at the Center for Nonproliferation Studies, “The greatest security risk is posed by Cobalt-60, Cesium-137, Iridium-192, Strontium-90, Americium-241, Californium-252, and Plutonium-238” (2004). Ferguson, et al.(2003) (as

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.

Cesium-137 (Cs-137)	Teletherapy, blood irradiations, and sterilisation facilities	Solid, chloride powder	30.1 yrs	beta and gamma radiation
Cobalt-60 (Co-60)	Teletherapy, industrial radiography, and sterilisation facilities	Solid, metal	5.3 yrs	beta and gamma radiation
Iridium-192 (Ir-192)	Industrial radiography and low dose bracytherapy	Solid, metal	74 days	beta and gamma radiation
Radium-226 (Ra-226)	Low dose bracytherapy	Solid, metal	1600 yrs	alpha and gamma radiation
Strontium-90 (Sr-90)	Thermo-electric generators	Solid, oxide powder	28.8 yrs	beta radiation
Amercium-241 (Am-241)	Well logging, thickness, moisture and conveyor gauges	Solid, oxide powder	433 yrs	alpha radiation
Plutonium-238 (Pu-238)	Heat sources for pacemakers and research sources	Solid, oxide powder	88 yrs	alpha radiation

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 being 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

Abraham, S. (26 May 2004). Comments by U.S. Energy Secretary Spencer Abraham to International Atomic Energy Agency in Vienna. Retrieved December 31, 2005 from http://www.energy.gov/engine/content.do?PUBLIC_ID=15949&BT_CODE=PR_SPEECHES&TT_CODE=PRESSSPEECH.

Blair, B. (1 October 2001). "What if the terrorists go nuclear?". Retrieved December 31, 2005 from http://www.cdi.org/terrorism/nuclear.cfm.

Chuen, C. (July 2004). Radiological materials in Russia. Retrieved December 31, 2005 from http://www.nti.org/e_research/e3_51a.html.

Coella, M., Thompson, S., Macintosh, S., and Logan, M. (May 2005). *An introduction to radiological terrorism*. Australian Journal of Emergency Management, vol. 20, no. 2. Retrieved December 31, 2005 from http://www.ema.gov.au/agd/EMA/rwpattach.nsf/VAP/(383B7EDC29CDE21FBA276BBBCE12CDC0)~AJEMMay02-Radiation.pdf/$file/AJEMMay02-Radiation.pdf.

Department of Homeland Security. (10 February 2003). Radiological Dispersion Devices Fact Sheet. Retrieved December 31, 2005 from http://www.dhs.gov/dhspublic/display?content=4232.

Farah, J. (18 July 2005). As quoted in WorldNetDaily.com article "Al-Qaeda's U.S. nuclear targets". Retrieved December 31, 2005 from http://www.worldnetdaily.com/news/article.asp?ARTICLE_ID=45313.

Farah, J. (13 June 2005). As quoted in WorldNetDaily.com article "Mexico's blind eye to Al-Qaeda activity". Retrieved December 31, 2005 from http://www.worldnetdaily.com/news/article.asp?ARTICLE_ID=44723.

Federal Emergency Management Agency. (28 January 2005). Are you ready? An in-de[th guide to citizen preparedness. Retrieved December 31, 2005 from http://www.fema.gov/areyouready/radiological_dispersion_device.shtm.

Ford, J. (March 1998). Radiological Dispersion Devices: Assessing the transnational threat. National Defense University - Institute for National Strategic Studies - Strategic Forum, No. 136. Retrieved December 31, 2005 from http://www.ndu.edu/inss/strforum/SF136/forum136.html.

Glasser, S, and Baker, P. (September 13, 2001). *Putin, Bush Weigh New Unity Against A 'Common Foe'*. Washington Post. Section A.25. Abstract retrieved December 31, 2005 from http://pqasb.pqarchiver.com/washingtonpost/access/80530530.html?dids=80530530:80530530&FMT=ABS&FMTS=ABS:FT&fmac=&date=Sep+13%2C+2001&author=Susan+B.+Glasser+and+Peter+Baker&desc=Putin%2C+Bush+Weigh+New+Unity+Against+A+%27Common+Foe%27

Hughes, D. (4 March 2002). When terrorists go nuclear. Popular Mechanics Magazine, online version. Retrieved December 31, 2005 from http://www.popularmechanics.com/science/defense/1281456.html?page=2&c=y.

Linzer, D. (29 December 2004). “Nuclear capabilities may elude terrorists, experts say”. Retrieved December 31, 2005 from http://www.washingtonpost.com/wp-dyn/articles/A32285-2004Dec28.html.

Litman, L. (Spring 2003). Harvard International Review: Development and Modernization. “Cleaning house: Dirty bombs and the Nuclear Non-Proliferation Treaty”. Retrieved December 31, 2005 from http://harvardir.org/articles/1092/.

Plough, A. (n.d.). Public health – Seattle and King County. Dirty bombs or RDDs: Commonly asked questions. Retrieved December 31, 2005 from http://www.metrokc.gov/health/radiation/dirtybomb.doc#damage.

Schopfer, C. (n.d.). Radiological Preparedness – Case studies: Training for accidents and "dirty bombs". New Jersey Center for Public Health Preparedness archives. Retrieved December 31, 2005 from http://www.njcphp.org/resources/.

World Health Organization. (February 2003). WHO/RAD information sheet. Radiological Dispersion Device (Dirty bomb). Retrieved December 31, 2005 from http://www.who.int/ionizing_radiation/en/WHORAD_InfoSheet_Dirty_Bombs21Feb.pdf