

# H-Diplo | Robert Jervis International Security Studies Forum

## Review Essay 95

William C. Potter, Sarah Bidgood, Samuel Meyer, and Hanna Notte, *Death Dust: The Rise, Decline, and Future of Radiological Weapons Programs* (Stanford University Press, 2024).

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The international security studies literature contains many thorough discussions of terrorists' potential to acquire radiological "dirty bombs," but it has mostly ignored the potential of states to do likewise.<sup>1</sup> Now, a crack team of nonproliferation experts led by the indefatigable William Potter has filled this gap in the literature with *Death Dust*, a fascinating comparative historical analysis of "all known prior cases of state-level pursuit of radiological weapons" (134). *Death Dust's* pioneering research concludes that while no state military can definitively be said to have inducted such weapons into its arsenal, at least three states went as far as testing a prototype. The United States and Soviet Union did so during the 1950s, followed by Iraq in the 1980s. In addition, two other states briefly conducted radiological weapons studies: the United Kingdom in the late 1940s-early 1950s, and Egypt in the 1960s.

To clarify the drivers and impediments of the five historical radiological weapons programs, the authors of *Death Dust* judiciously consider the relative impact of military needs, international status concerns, scientific and technological potentialities, economic and organizational resources, and bureaucratic politics. Although they find that each case was unique in certain respects, some typical patterns emerge.

First, the most common catalyst of the birth of radiological weapons programs has been strong assertions by well-connected scientific idea entrepreneurs that such weapons could fill the military's need for "area denial" capabilities (e.g., 28, 61, 89-92, 114, 139). The lone partial exception to this typical pattern was the Soviet Union, whose military rebuffed scientists' proposals for radiological weapons research until high-level policymakers found out about the nascent programs of the US and the UK and became determined to match them stride for stride (see 42-45).

Second, the main reason for the demise of most radiological weapons programs has been the dawning realization of their inferior cost-performance from the military standpoint. Radiological weapons have consistently been found to be both more difficult to build and handle, and less effective on the battlefield

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<sup>1</sup> On the possibility of radiological terrorism, see, e.g., Bryan R. Early, Matthew Fuhrmann and Quan Li, "Atoms for Terror? Nuclear Programs and Non-Catastrophic Nuclear and Radiological Terrorism," *British Journal of Political Science* 43, 4 (2013): 915-936; BreAnne K. Fleer, "Radiological-Weapons Threats: Case Studies from the Extreme Right," *Nonproliferation Review* 27, 1-3 (2020): 225-242; Brian Michael Jenkins, *Will Terrorists Go Nuclear?* (Amherst, NY: Prometheus Books, 2008); National Academies of Sciences, Engineering, and Medicine, *Risk Analysis Methods for Nuclear War and Nuclear Terrorism* (Washington, DC: National Academies Press, 2023); Christoph Wirz and Emmanuel Egger, "Use of Nuclear and Radiological Weapons by Terrorists?" *International Review of the Red Cross* 87, 859 (September 2005): 497-510.

than other available conventional and unconventional area denial weapons options. (*Death Dust's* empirical finding that military planners have overwhelmingly focused on the tactical goal of area denial rather than the strategic potential of radiological weapons is one of its most significant discoveries.<sup>2</sup>) Once it becomes clear that these are not wonder-weapons, bureaucratic and political support for the programs fades away. The book quotes a pertinent comment by Iraqi scientist Hussein Shahrstani: “When physics dictate reality, no amount of expertise can overcome the obstacles” (124).

*Death Dust's* greatest strength is the authors' prodigious digging into the historical record. They have done their level best to scrape every last shred of available historical evidence on radiological weapons programs worldwide. The chapter on Egypt's program is especially telling in this regard, as it was at most only a short-lived, exploratory effort, and the authors admit that their evidence for even that conclusion is weak (80). Indeed, the chapter relies heavily on the testimony of a very unreliable source, an Austrian scientist who claimed to have inside information on the Egyptian radiological weapons program after Swiss authorities arrested him for spying for Israel. The Egypt chapter is nevertheless illuminating because it shows that the authors' search for historical cases did not stop at clear instances of radiological weapons pursuit but also included gray-zone exploratory efforts. This raises the question of why they did not find more than five historical cases since the 1940s. Given the secrecy that typically enshrouds these types of programs, it is true that open-source research can only glimpse the tip of the iceberg. But the authors' fruitless labors to find evidence for additional programs, including their careful consideration of recent Russian accusations that Ukraine has one (3, 149-152), leads me to think that probably there is no iceberg.

If this educated guess that radiological weapons programs have been exceedingly rare since the 1950s is correct, then why might that be? Properly answering this question would require looking beyond *Death Dust's* five cases of historical radiological weapons programs and examining other countries that decided not to go down that road. Admittedly, it is hard to study a non-event, but it should be possible to unearth rejected radiological weapons research proposals in the archival records of the scientific funding bodies of various countries around the world.

A different, more theoretically driven approach to this dog-that-did not-bark question would explore the contrast between the declining frequency of radiological weapons programs and the (modestly) rising frequency of nuclear weapons programs after the mid-1950s. To my mind, a plausible hypothesis to explain these diverging trajectories is that the global leader states of the early postwar period—the US, USSR, and UK—did induct nuclear weapons into their arsenals, thus sending a signal to the rest of the world that those weapons were worth the effort; but they did not induct radiological weapons into their arsenals, thus sending a signal that those weapons were not worth it. The authors of *Death Dust* report that they found little support for the role of copycat behavior as a *driver* of radiological weapons proliferation, except for the Soviet case (see 137-138), but they do not investigate the possibility that copycat behavior has been an *inhibitor* of such proliferation.

Another, less optimistic hypothesis to explain the paucity of radiological weapons programs since the 1950s might be that the proliferation of civilian nuclear facilities around the world has already set the table for potential radiological aggression. What is a “radiological weapon” after all? A nuclear reactor or nuclear waste dump may not look like what we conventionally think of as a “weapon,” but it actually creates a critical vulnerability that a state's foreign enemies can readily exploit. Nine-tenths of the radiological weapon is already sitting there, just waiting for the spark that will ignite it. Therefore, there is no need for the state's enemies to acquire a radiological weapons arsenal *per se*. Instead, they can cause a radiological disaster with conventional artillery shells, a computer virus, or a turncoat nuclear plant insider. This logic is well-understood in US military circles, as Admiral (ret.) Eugene Carroll of the Center for Defense Information

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<sup>2</sup> The partial exceptions here are “the inchoate nature of the Egyptian RW effort” (106), as well as the intermittent US interest in “salting” thermonuclear weapons with cobalt to produce extra radiation effects (55).

explained to an interviewer in 1997: “You don’t have to take the bang to the enemy; the bang is already there when you take out his nuclear plants.”<sup>3</sup>

In *Death Dust’s* concluding chapter, the authors note that Russia’s takeover and mismanagement of the Zaporizhzhia Nuclear Power Plant is threatening to inflict a radiological disaster on Ukraine (149). They also note, but without connecting the dots, that a major sticking point in the UN Committee on Disarmament’s failed negotiations over a Radiological Weapons Ban Treaty during the 1980s and 1990s “was the question of whether to extend the RW prohibition to attacks on nuclear facilities” (156). Evidently, some states like having the option to spread harmful radiation inside another country—and if they can have it without paying the financial or reputational cost of building a radiological weapons arsenal, so much the better.

Attacks on nuclear facilities have been a recurrent, albeit infrequent, pattern in interstate warfare dating back to the 1940s.<sup>4</sup> Moreover, the historical record shows that not even the possession of a nuclear arsenal is sufficient to deter such attacks.<sup>5</sup> For instance, Hamas, the de facto government of the Gaza Strip, announced on October 28 that it had fired rockets at the Israeli nuclear reactor at Dimona.<sup>6</sup> Hamas’ missiles missed their mark, but the leader of Hezbollah has also recently threatened to launch his highly advanced missile technology at Dimona and thereby “send Israel back to the stone age.”<sup>7</sup> The ambition to blow up Dimona is not new; already during the 1991 Gulf War, Iraq launched Scud missiles at the facility.<sup>8</sup>

The broader point here is that adopting a narrow focus on states’ efforts to build radiological *bombs* might cause us to underestimate their proclivity to engage in radiological *attacks*. To develop more comprehensive radiological threat assessments, historical case study research on this topic should broaden its scope to examine the entire spectrum of ways and circumstances in which militaries have envisaged spreading the “death dust.”

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<sup>3</sup> Suzy T. Kane, “The Bombed Nuclear Reactor in Iraq: Another first for the U.S.” *Fellowship* 63:1-2 (1997): 16-17.

<sup>4</sup> Matthew Fuhrmann and Sarah E. Kreps, “Targeting Nuclear Programs in War and Peace: A Quantitative Empirical Analysis, 1941-2000,” *Journal of Conflict Resolution* 54, 6 (2010): 831-859.

<sup>5</sup> Fuhrmann and Kreps, “Targeting Nuclear Programs in War and Peace,” Online Appendix A, available at <https://journals.sagepub.com/doi/abs/10.1177/0022002710371671>.

<sup>6</sup> See, e.g., Emanuel Fabian, “Hamas Claims to Fire Rockets at Dimona,” *The Times of Israel*, 28 October 2023, available at [https://www.timesofisrael.com/liveblog\\_entry/hamas-claims-to-fire-rockets-at-dimona/](https://www.timesofisrael.com/liveblog_entry/hamas-claims-to-fire-rockets-at-dimona/). Hamas had already done the same in 2014: Yaakov Lapin and JPost.com staff, “Hamas: We Attempted to Hit the Nuclear Reactor at Dimona,” *The Jerusalem Post*, 9 July 2014, available at <https://www.jpost.com/operation-protective-edge/rocket-alert-sirens-sound-in-zichron-yaakov-120-km-north-of-gaza-362087>.

<sup>7</sup> Hezbollah’s threat was in response to the Israeli defense minister’s similarly phrased threat against Hezbollah and Lebanon some days before. “Hezbollah Leader Issues Stark Warning Amid Escalating Border Tensions with Israel,” *Al Arabiya News*, 15 August 2023, available at <https://english.alarabiya.net/News/world/2023/08/15/Hezbollah-leader-issues-stark-warning-amid-escalating-border-tensions-with-Israel>

<sup>8</sup> Daniel Williams, “Scuds Can’t Harm Nuclear Reactor Targeted by Baghdad, Israel Insists,” *Los Angeles Times*, 19 February 1991, available at <https://www.latimes.com/archives/la-xpm-1991-02-19-mn-1721-story.html>.