HARVARD Kennedy School
BELFER CENTER for Science and International Affairs
Policy Brief • October 2011

QUARTERLY JOURNAL: *INTERNATIONAL SECURITY*

Attacks on Nuclear Infrastructure: Opening Pandora's Box?

BOTTOM LINES

- **Bold Claims, Inconclusive Evidence?** The empirical record does not support claims that air strikes on states' nuclear weapons infrastructure always produce the desired results.
- **Impact Distribution.** Discriminate preventive attacks may temporarily halt nuclear programs, but targeted states with advanced nuclear capabilities may intensify and complicate proliferation risks.
- **Unintended Consequences.** Attacking a state's nuclear infrastructure can force its nuclear weapons program underground and create a false sense of security in the outside world.

By Målfrid Braut-Hegghammer

This policy brief is based on "Revisiting Osirak: Preventive Attacks and Nuclear Proliferation Risks," which appears in the Summer 2011 issue of International Security.

ATTACKS ON NUCLEAR PROGRAMS

Advocates argue that air strikes against the nuclear infrastructure of a targeted state can deny it the option of producing nuclear weapons or at least create delays in its nuclear weapons program. Critics counter that such attacks may intensify the state's determination to acquire nuclear weapons and make a difficult problem more challenging in the long term. Despite the apparent appeal of targeted strikes, states rarely resort to them.

States have often considered using force to deny their rivals nuclear weapons (for example, the United States contemplated attacks against China's nuclear weapons program during the Cold War), but they have rarely done so. States have, however, targeted such attacks against enemies suspected of developing a nuclear weapons option rather than against adversaries on the threshold of acquiring these weapons. There are arguably only three instances of discriminate attacks on nuclear infrastructure: Allied attacks on a heavy water plant in occupied Norway during 1942–43, Israel's strikes on the Iraqi Osirak reactor in 1981, and an Israeli attack against an alleged Syrian reactor site in 2007. (Nuclear sites were also targeted during the 1980–88 Iran-Iraq War and the 1991 Persian Gulf War. Other covert actions have targeted scientists from the Iraqi and Iranian nuclear programs, technology in transit to Iraq, and the software operating centrifuges at Iran's Bushehr site.) Attacks on the Norwegian heavy water plant at Vemork, which were carried out by Norwegian resistance operatives with Allied support to prevent heavy water from reaching the German nuclear program, and Israeli air strikes against Syria's al-Kibar site were preventive attacks intended to deny states the option of developing nuclear weapons.

The legitimacy and consequences of the 1981 Osirak attack remain in dispute. Advocates argue that it was a preemptive attack and therefore permitted under international law. Critics claim that, as a research reactor, Osirak did not constitute an acute

proliferation risk, given its design characteristics and subjection to safeguards monitoring. Recent evidence confirms that the Osirak reactor was intended not to produce plutonium for a weapons program, but rather to develop know-how that would be necessary if Iraq acquired an unsafeguarded reactor better suited for large-scale production of plutonium. Israel's attack triggered a far more focused and determined Iraqi effort to acquire nuclear weapons. When the program was interrupted by the 1991 Gulf War, Iraq stood on the threshold of acquiring a nuclear weapons capability.

IMPACT: ACCELERATE OR DELAY?

To assess how air strikes affect nuclear proliferation risks, it is useful to distinguish between preventive and preemptive attacks. Targeting a research reactor that is suspected of being part of an effort to develop nuclear know-how, and perhaps intended for a future breakout option, could have qualitatively different consequences from those of attacking nuclear sites in a state that is mastering the complete nuclear fuel cycle. The results are likely to differ in terms of both the resulting delay—a state that is mastering advanced nuclear technology will require less time to rebuild the destroyed capabilities than a state that has initiated only research and development efforts—and the perceived costs of proceeding with a nuclear weapons program. For a state that has invested in advanced technology, the sunk costs and vested interests of domestic elites are likely to enhance the appeal of reconstituting what has been lost. In contrast, states with an embryonic nuclear infrastructure may perceive the costs of rebuilding what has been destroyed as unacceptable. These states may also experience difficulties locating suppliers willing to provide sensitive nuclear technology.

Generalizing about the effects of attacking nuclear infrastructure is a difficult task, because the long-term outcome will also be influenced by the targeted state's security environment. A plausible hypothesis, however, is that the distribution of probable outcomes resembles a bell curve. At one end, states with minimal nuclear infrastructure may present a smaller proliferation risk because of the increased costs of developing a nuclear weapons capability. In the middle section, attacks on states that are moving toward completion of the fuel cycle may produce more mixed outcomes. On the one hand, developing a domestic nuclear weapons capacity will be more costly following the destruction of key sites. Targeted attacks, however, may create a domestic incentive to build a deterrent to avoid similar strikes in the future. The result could be a more determined pursuit of nuclear weapons, making the acquisition of such weapons a more likely outcome than would otherwise have been the case. On the other hand, the costs of developing a nuclear weapons capability, combined with changing security concerns (or fear of another attack), may discourage state elites from pursuing these weapons. At the other end of the curve, attacks on states that have mastered the complete nuclear fuel cycle may increase the risk of proliferation. For states such as Iran, which are capable of producing fissile material but seem to lack elite consensus to proceed with a nuclear weapons program, an attack could accelerate acquisition of a nuclear weapon.

IMPLICATIONS FOR POLICYMAKERS

The historical record suggests that nuclear proliferation risks cannot be easily eliminated by targeted air strikes. Strikes can buy time, but to what end? The short-term benefits of destroying key nodes in the nuclear infrastructure of a state suspected of proliferation seems appealing to states seeking to counter proliferation, but potentially counterproductive long-term consequences suggest that this approach is not a silver bullet. Attacks on states that are advancing toward a complete nuclear fuel cycle or that have already crossed that technical threshold can produce new risks. In the former case, such attacks may have mixed effects and could elevate proliferation risks in the long term. In the latter case, the targeted state may accelerate its efforts to acquire nuclear weapons.

In addition, preventive attacks can create a false sense of security in the outside world and drive nuclear weapons programs to underground sites. Both sets

of developments make it more difficult to grasp, and cope with, the long-term proliferation risks posed by the targeted state.

Failure to address the domestic political consequences of targeted attacks can undermine the value of whatever positive results the attacks may have been produced. For example, if the nuclear infrastructure of Iran were attacked, Iranian elites might solidify their desire for nuclear weapons. Unless Iran was then presented with incentives to abstain from acquiring nuclear weapons, it would likely continue down the nuclear path. Some observers suggest that repeated strikes could control subsequent risks, but this does not appear to be a lasting solution. States known to have pursued a nuclear weapons option, including Iran, Iraq, and Libya, have approached the United States with offers to trade their nuclear capabilities for a chance at rapprochement. Although targeted strikes may narrow the scope for negotiation, political engagement is vital for containing longer-term proliferation risks. As demonstrated by North Korea during the 1994–2000 Agreed Framework, engagement seems to be a more productive strategy than isolation for containing states on the path to acquiring nuclear weapons.

CONCLUSION

Despite the intuitive appeal of attacking states' nuclear infrastructure to curb proliferation, the empirical record gives reason for caution. On the one hand, targeted attacks can slow progress toward acquiring nuclear weapons. For states in the early stages of nuclear research, an attack can make the prospect of developing nuclear weapons seem too costly and too difficult. On the other hand, an attack on a state with a more robust infrastructure could accelerate its efforts to acquire nuclear weapons. Unless strikes are accompanied by actions designed to address the security concerns of the targeted states, the long-term effects may prove counterproductive. Such attacks may not only speed the targeted state's efforts to produce nuclear weapons, but also create a false sense of security in the outside world.

• • •

Statements and views expressed in this policy brief are solely those of the author and do not imply endorsement by Harvard University, the Harvard Kennedy School, or the Belfer Center for Science and International Affairs.

RELATED RESOURCES

Betts, Richard K. "The Osirak Fallacy," *National Interest*, Vol. 83 (Spring 2006): 22-25.

Fuhrmann, Matthew, and Sarah E. Kreps. "Targeting Nuclear Programs in War and Peace." Discussion Paper 2009-11, Belfer Center for Science and International Affairs, Harvard Kennedy School, October 2009.

Malin, Martin B. "The Effectiveness and Legitimacy of Using Force to Prevent Nuclear Proliferation," in Christopher Daase and Oliver Meier, eds., *Coercive Arms Control* (New York: Routledge, 2010).

Raas, Whitney, and Austin Long. "Osirak Redux? Assessing Israeli Capabilities to Destroy Iranian Nuclear Facilities," International Security, Vol. 31, No. 4 (Spring 2007): 7–33.

ABOUT THE BELFER CENTER

The Belfer Center is the hub of the Harvard Kennedy School's research, teaching, and training in international security affairs, environmental and resource issues, and science and technology policy.

The Center has a dual mission: (1) to provide leadership in advancing policy-relevant knowledge about the most important challenges of international security and other critical issues where science, technology, environmental policy, and international affairs intersect; and (2) to prepare future generations of leaders for these arenas. Center researchers not only conduct scholarly research, but also develop prescriptions for policy reform. Faculty and fellows analyze global challenges from nuclear proliferation and terrorism to climate change and energy policy.

ABOUT THE AUTHOR

Målfrid Braut-Hegghammer is Assistant Professor at the Norwegian Defence University College.

ABOUT *INTERNATIONAL SECURITY*

International Security is America's leading peer-reviewed journal of security affairs. It provides sophisticated analyses of contemporary, theoretical, and historical security issues. *International Security* is edited at Harvard Kennedy School's Belfer Center for Science and International Affairs and is published by The MIT Press.

For more information about this publication, please contact the *International Security* editorial assistant at 617-495-1914.

FOR ACADEMIC CITATION:

Braut-Hegghammer, Målfrid. "Attacks on Nuclear Infrastructure: Opening Pandora's Box?" Policy Brief, Belfer Center for Science and International Affairs, Harvard Kennedy School, October 2011.

Belfer Center for Science and International Affairs

Harvard Kennedy School
79 JFK St.
Cambridge, MA 02138

TEL: 617-495-1400
FAX: 617-495-8963
http://www.belfercenter.org