CHAPTER 7

THE CHALLENGES OF U.S. PREVENTIVE MILITARY ACTION

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For some U.S. policymakers and military planners, Israel's 1981 raid on Iraq's Osiraq nuclear reactor may serve as an object lesson regarding the potential benefits of preventive military action against Iran's nuclear program. Not widely appreciated is how risky and difficult the Osiraq raid was, and how the factors which ensured its success make attempting similar action against Iran's nuclear facilities so challenging. U.S. preventive action against Iran's nuclear program would necessarily bear little resemblance to the Osiraq raid, and the results would unlikely be as decisive and lasting.

The success of the Osiraq operation obscured difficulties in planning and execution. The raid was the longest mission the Israeli Air Force had undertaken at that time. The strike package (eight F-16s escorted by six F-15s) flew nearly the entire 2,000 km mission over hostile airspace, yet managed to achieve surprise. The F-16s were operating very close to their maximum unrefueled combat radius; had they been challenged by Jordanian, Saudi, or Iraqi aircraft, they would have lacked endurance to engage in evasive maneuver or sustained aerial combat. The raid on Osiraq pushed Israel's air force to the very limits of its operational capabilities.[1]

Several factors contributed to the Israeli success in 1981:

- The Osiraq reactor—a highly visible and vulnerable target—was the centerpiece of Iraq's nuclear program, and its destruction set the effort several years back.[2] Learning from this experience, Iraq subsequently dispersed and hid its nuclear infrastructure. Other proliferators—including Iran—have since done the same.[3]

- Israel may have benefited from French aid in destroying Osiraq. French intelligence reportedly emplaced a homing beacon at Osiraq to help Israeli pilots locate the facility or target a critical underground structure there.[4]

- For Israel, Iraq was an enemy state that was pledged to its destruction. For Israeli cabinet members who voted in favor of the raid, the imperative to eliminate a perceived existential threat ultimately overshadowed countervailing political considerations.

- Iraq was at war with Iran at the time, and was thus constrained in its ability to strike back against Israel. Retaliation eventually took the form of an unsuccessful Iraqi attempt to strike the Israeli nuclear reactor at Dimona with missiles during the 1991 Gulf War.

Many of the conditions that were conducive to success at Osiraq, however, do not apply to the case of U.S. preventive action against Iran's nuclear program. In particular:

- Key elements of Iran's nuclear program are dispersed and concealed. Accordingly, it would not be possible to disable Iran's nuclear program by a single strike against a solitary facility; multiple simultaneous strikes against several sites would probably be required.

- While foreign technicians and advisors have access to parts of the declared civilian nuclear program (notably the Bushehr power plant), facilities involved in any clandestine parallel program are almost certainly off-limits to foreigners.

- Though relations between Washington and Tehran are tense and occasionally hostile, the United States is interested in encouraging political change in Iran, and in improving relations with that country. Preventive action might complicate, if not undermine, these efforts.

- Iran could respond to a preventive strike by retaliating against U.S. interests in Iraq, the Persian Gulf region, or against the United States itself, by means of Iranian agents or associated terrorist groups such as the Lebanese Hizballah.

For these reasons, preventive action against Iran (whether covert action involving U.S. intelligence assets or overt military action by U.S. military forces) is a much more complicated proposition than the Israeli strike on Osiraq. Significant intelligence and targeting challenges would have to be overcome, the potential for a nationalistic backlash in Iran and renewed tensions with U.S. allies would have to be managed, and Iranian retaliation would have to be deterred or disrupted.

Nonetheless, prevention must be given serious consideration for a number of reason: it is unclear whether the diplomatic option that the United States is now pursuing will bear fruit; solutions may be found to the intelligence, targeting, political, and security challenges of preventive action against Iran; and by keeping this option on the table, the United States can use the threat of prevention as a spur to multilateral diplomacy.

This chapter will thus assess the risks, challenges, and implications of prevention, assuming that the potential consequences of a nuclear Iran are sufficiently grave to justify consideration of such a potentially perilous course of action. It will not, however, evaluate the risks of *not* taking preventive action or the implications of a nuclear Iran for U.S. interests, which is a necessary element of any net assessment of the pros and cons of preventive action, but beyond the scope of this chapter.[5]

IRAN'S NUCLEAR PROGRAM: A HARD TARGET

Bushehr: Part of the Nuclear Target Set.

Iran's nuclear program has made steady progress. The power plant at Bushehr is finally approaching completion. According to Russian officials, Unit I at Bushehr may be completed by late 2003 or early 2004, with the first consignment of reactor fuel to be

delivered during this timeframe.[6] Problems have dogged Iran's nuclear program from its inception. Russia originally undertook to complete Unit I by 1999, though technical and financial problems caused repeated delays. It is conceivable that new technical snafus, a Russian decision to hold-up the shipment of reactor components or fuel, or teething problems during reactor startup, could further delay completion of the project. Iranian officials have indicated, however, that the successful completion of Unit I might lead to contracts for additional nuclear power plants at Bushehr and Ahvaz, providing a powerful incentive for continued Russian cooperation.

Bushehr provides Iran with two potential routes to "the Bomb": low-enriched uranium fuel earmarked for Bushehr could be diverted and further enriched to weapons-grade material, or the reactor could be used to produce plutonium for weapons use.

Though not ideally suited for the purpose, Bushehr could produce enough plutonium for dozens of nuclear weapons per year. If Tehran were willing to violate its Nuclear Nonproliferation Treaty (NPT) commitments or withdraw from the NPT, Iran could separate truly prodigious quantities (scores of bombs worth) of weapons- or reactor-grade plutonium annually—depending on fuel burn-up. Although reactor-grade plutonium is not ideal for bombmaking (Heat and radioactivity makes it difficult and dangerous to work with, while its isotopic composition makes for an inefficient and unreliable bomb in rather crude weapons designs.), the United States demonstrated the military utility of reactor-grade plutonium in a 1962 underground nuclear explosive test.[7] Assuming that the Bushehr reactor comes on line in early 2004, Iran could start producing spent fuel containing plutonium by some time in 2005. Separation of plutonium from spent fuel and weaponization could take several months more, provided that Iran had the requisite know-how. Thus, Iran could conceivably produce a bomb using plutonium from Bushehr within three or four years.

Clandestine Fissile Material Production: Dispersed, Hardened, Hidden?

In response to detailed allegations by an expatriate Iranian opposition group, Iran has acknowledged that it is building a heavy-

water production plant and plans to build a 40MWt natural uranium research reactor at Arak, and that it is constructing a gas-centrifuge plant at Natanz. The existence of these facilities, confirmed by the International Atomic Energy Agency (IAEA) in a June 2003 report to its Board of Governors,[8] and Iran's prior failure to declare their existence, raises the troubling question of whether these facilities were formerly intended to be core elements of a clandestine weapons program.

Little is known about the natural uranium reactor that Iran plans to build at Arak, but Iranian officials have indicated that it will be a CANDU-type design intended for research purposes.[9] A typical 40MWt research reactor could produce sufficient plutonium for a few weapons a year. Construction of such a reactor usually takes 5-7 years, so it will be some time before this reactor becomes a factor in Iran's proliferation calculus.

The Iranian centrifuge program reportedly benefited from Pakistani help in the early 1990s (and perhaps more recently) and North Korean help in the late 1990s, and appears to have made steady progress.[10] Iran is currently building a uranium conversion facility at Esfahan to produce uranium hexafluoride feed-stock for its centrifuge program; Iranian officials claim that the plant is nearly ready to start operation. Moreover, a February 2003 IAEA visit revealed that Iran is producing gas centrifuges. (If it tested these using uranium hexafluoride gas before commencing mass production—and it seems implausible that it would not have done so—it may have already broken its NPT commitments.) A visit to a facility at Natanz found a small pilot cascade of 160 centrifuges and parts for 1,000 more, in a facility large enough to accommodate 50,000 centrifuges. The discovery of Natanz has raised questions about the possible existence of clandestine centrifuge cascades elsewhere in Iran.

More recently, the National Council for Resistance—the Iranian opposition group that first revealed the existence of nuclear facilities at Arak and Natanz in August 2002—has claimed that such a pilot plant is located at Kalahdouz (about 14km west of Tehran) and that Iran is building a fuel-fabrication facility at Ardekan (about 30km northwest of Yazd, in central Iran)—presumably to service the fuel requirements of the Bushehr reactor.[11]

In sum, Iran appears well on the way to attaining all of the elements needed to produce large quantities of fissile material by either the plutonium or uranium-enrichment routes. Assuming all goes right for Iran, it could produce its first nuclear weapon within three or four years. The window of opportunity for effective preventive action may well be better measured in months than in years.

North Korea: An Alternative Source of Fissile Material?

Over the past 2 decades, Iran has emerged as the premier customer for North Korean arms, missiles, and, more recently, nuclear technology. Were North Korea to reprocess its declared stock of spent fuel (it appears to have started doing so already), it could separate enough plutonium within a matter of months for five to six nuclear weapons. Pyongyang might then opt to export some of that plutonium. Were North Korea to continue its uranium enrichment program, resume operation of its existing reactor, and complete work on two unfinished reactors, it could be producing enough fissile material within 5 years for up to 50 nuclear weapons per year.[12] Based on its record, there is reason to believe that Pyongyang might be willing to sell fissile material and weapon design data to proliferators in the Middle East and elsewhere. Thus, North Korea offers an alternative, nonindigenous route for the acquisition of fissile material by Iran.

THE CHALLENGES OF PREVENTION

Preventive action cannot stop a determined proliferator as far along as is Iran, though it could substantially delay Iran's nuclear progress. The principal goal of U.S. action would be to delay Iran's nuclear program long enough to allow for the possible emergence of new leadership in Tehran willing to either eschew nuclear weapons, freeze its nuclear program short of the production of fissile material, or act responsibly, should it acquire nuclear weapons.

Intelligence Challenges.

The United States could pay a high price for preventive action, including an anti-American nationalist backlash in Iran, damage to its international standing, and the death of U.S. citizens targeted by Iranian retaliation. Accordingly, U.S. decisionmakers will have to feel reasonably confident that preventive action will significantly delay Iran's acquisition of its first nuclear weapon by a number of years, before they could countenance such a course of action. Simply imposing human or material costs or causing modest delays will—under most circumstances—not likely be considered a sufficiently large payoff to justify the possible risks and costs involved.

Such a cost/benefit calculus will translate to exacting requirements for detailed, accurate, and complete intelligence regarding Iran's nuclear program. Here, the U.S. track record is not particularly encouraging; for years, Iraq, North Korea, and most recently Iran, successfully hid large parts of their nuclear programs from the United States. Significant intelligence gaps concerning Iran's nuclear program may remain. The fact, however, that sensitive information about Iran's nuclear program is finding its way to expatriate Iranian opposition groups indicates that there may be "leakers" in the program who might be willing to provide sensitive information to foreign intelligence services. The possibility that the United States could obtain actionable intelligence regarding Iran's nuclear program should not be ruled out.

Technical Challenges.

The technical processes related to fissile material production create both vulnerabilities and challenges. Plutonium programs may be vulnerable to interdiction due to their reliance on large reactors that produce significant signatures—though it may be possible to locate a plutonium production reactor underground to reduce prospects for detection and destruction.[13] Destroying the reactor at Bushehr or the one planned for Arak might set back Iran's plutonium program several years, provided Iran is not building or operating a clandestine plutonium production reactor elsewhere.

While it would be preferable to target these prior to start-up to avoid exposing civilians downwind to fallout, there may be ways to disrupt operations or destroy the reactors after start-up without releasing radioactive material into the environment and creating a downwind hazard.

Centrifuge programs pose a more complex set of challenges. A large number of workshops and factories may be involved in producing and assembling centrifuges, and they can be widely dispersed and easily hidden. Centrifuge cascades have relatively low electrical power requirements (a tell-tale signature of other enrichment technologies), and can be housed in small, dispersed, nondescript facilities which would be difficult to detect by means of remote sensors, as well as in huge plants—such as the one at Natanz.[14] If preventive action is to have a long-term impact, both centrifuge component production and gas centrifuge enrichment facilities would have to be destroyed, which may not be practically possible. The uranium conversion plant under construction at Esfahan is also a likely target. Destroying it could set back Iran's centrifuge program several years—provided Iran does not possess a pilot plant or duplicate facility elsewhere.

Political Challenges.

There seems to be broad support across political factions in Iran for the government's efforts to acquire nuclear weapons.[15] Thus, should the United States act preventively, it must do so in a way that ensures that such action does not poison the reservoir of pro-American goodwill among young Iranians or derail the movement for political reform, thereby complicating efforts to encourage political change and improve U.S.-Iranian relations. In political terms, overt U.S. military action would entail the greatest risk. For this reason, the United States might first consider other options, such as preventive action by allies, or covert action on its own.

OPTIONS FOR PREVENTIVE ACTION: ALLIED, COVERT, OR OVERT?

Allied (Israeli) Military Action.

Other than Israel, few, if any, U.S. allies would be willing or able to carry out such an operation. However, Iran's leaders (and many others in Iran and elsewhere) would tend to see an American hand behind an Israeli military operation, and Iran might be tempted to strike back in ways that would harm both Israel and the United States (e.g., by encouraging Palestinian or al-Qaida terrorism against Israeli or American targets, or goading the Lebanese Hizballah—with its thousands of katyusha rockets in southern Lebanon—to heat up the border with Israel). Israel, however, might be willing to accept these risks in order to deal with a perceived existential threat.

Covert U.S. Action.

Covert action would probably be the most politically expedient way for the United States to disrupt Iran's nuclear program. It might include one or more of the following measures, including:

- harassment or murder of key Iranian scientists or technicians;

- introduction of fatal design flaws into critical reactor, centrifuge, or weapons components during their production, to ensure catastrophic failure during use;

- disruption or interdiction of key technology or material transfers through sabotage or covert military actions on land, in the air, or at sea;

- sabotage of critical facilities by U.S. intelligence assets, including third country nationals or Iranian agents with access to key facilities;

- introduction of destructive viruses into Iranian computer systems controlling the production of components or the operation of facilities;

- damage or destruction of critical facilities through sabotage or direct action by U.S. special forces.

Some of these actions might have only a modest effect on Iran's nuclear effort; others might have a significant impact. Covert action could, however, reduce the risks of a political backlash and retaliation—since it might not be possible for Iranian authorities to determine, for instance, whether the death of a scientist was due to natural or unnatural causes, or whether damage to a critical facility was due to an industrial accident or sabotage.

For covert action to succeed, the United States would have to disrupt both Iran's plutonium and uranium-enrichment programs. This might require a sustained covert campaign entailing various actions—the assassination of key personnel, the recruitment of agents or saboteurs at key facilities, the subversion of critical computer networks, direct action operations against critical facilities, etc. Any one of these actions would be difficult enough to pull off; conducting a sustained campaign in which the United States maintained plausible deniability would be even harder. For this reason, covert action may have a role to play, but is unlikely to have a broad, long-term impact on Iran's nuclear program.[16]

Overt U.S. Action.

Overt military action (e.g., cruise missile and/or air strikes) may offer the best hope for success. For political and operational security reasons, however, the United States would probably avoid staging from facilities in friendly Arab states in the region. (And most Arab states would probably prefer not to aid or abet such an operation, to avoid becoming a target for Iranian retaliation.) U.S. decisionmakers would probably prefer to go it alone, rather than approach regional partners with requests for access, basing, or overflight privileges that would likely yield only marginal military benefits, while possibly

compromising the operation and straining relations with important friends and allies.

Such a mission is likely to rely on naval platforms capable of launching Tomahawk land-attack cruise missiles (TLAMS) and strike aircraft against targets in southern and central Iran, while Air Force B-52s and B-2 stealth bombers operating from the continental United States would likely be tasked to strike targets deep in Iran (e.g., near Tehran). Range would not be a problem, and providing they achieve surprise, U.S. forces would stand a good chance of avoiding losses at the hands of Iranian air defenses. Nearly all fixed wing fighter aircraft in the U.S. Naval and Air Force inventory can deliver precision munitions, and the United States has a number of conventional penetrator munitions (such as the GBU-28 laser-guided bomb and the AGM-86D Conventional Air-Launched Cruise Missile Block III) for use against hardened and/or buried facilities. (The Natanz centrifuge facility will reportedly be hardened and buried—protected by several meters of reinforced concrete and buried some 75 feet underground when completed.)[17] There are, however, significant challenges associated with the targeting of hardened, buried facilities.[18]

Overt action, however, is politically problematic. It could prompt an anti-American backlash among formerly friendly Iranians, strengthen the hand of hard-liners, and prompt the regime to retaliate against U.S. interests in the Gulf or elsewhere. For this reason, should overt military action be deemed necessary, Washington would be wise to make a serious effort to mitigate a possible backlash by explaining that its actions derived from a desire to prevent nuclear weapons from falling into the hands of the hard-liners who are loathed by many Iranians for their involvement in repression at home and terrorism abroad. This is a concern that many Iranians might understand—if not share. And through verbal and written warnings, military demonstrations, preventive arrests of Iranian agents, and other measures, the United States should take steps to deter and/or disrupt Iranian attempts to retaliate.

IRAN'S RETALIATORY CAPACITY

Should it choose to retaliate, Iran has several options: it could disrupt oil shipments from the Persian Gulf; attack U.S. Naval assets in the region; or engage in subversion and terrorism against U.S. allies and interests.

Iran could disrupt oil exports and shipping in the Gulf. According to a recently published U.S. defense intelligence assessment, "Iran's navy . . . could stem the flow of oil from the Gulf for brief periods by employing a layered force of diesel-powered KILO submarines, missile patrol boats, naval mines, and sea and shore-based anti-ship cruise missiles."[19] It is unclear, however, what Iranian policy objective would be served by this course of action: such a step would likely invite reprisals against Iran's oil production infrastructure and exports via the Strait of Hormuz (which accounts for about 85 percent of Iran's foreign exchange earnings), causing grave harm to Iran's economy, which is the clerical regime's "Achilles' heel." This is an option of last resort for Iran, to be used only if denied the use of the strait, or if other vital interests were threatened.

Likewise, Iran could attack U.S. Naval assets in the Gulf, and in a surprise attack, it might succeed in inflicting painful losses on elements of the 5th Fleet (the Naval equivalent of a "sucker punch"). There can, however, be little doubt that the U.S. riposte would cripple or destroy Iran's navy. This would likewise be a risky course of action for Iran.

Iran's capacity for terror and subversion remains one of Tehran's few levers in the event of a confrontation with the United States, since—barring the use of chemical or biological weapons—it otherwise lacks the ability to challenge the United States on anything near equal terms. In response to U.S. prevention, Iran might sponsor terrorism in Kuwait, Bahrain, Qatar, the UAE, and Oman—all of which host important U.S. military facilities—to sow fear among the Arab Gulf states and cause them to curb U.S. access to military facilities in the Gulf. And thanks to its ties to the Lebanese Hizballah (considered by U.S. officials as "the A-Team of terrorism") and, more recently, its provision of safe haven and assistance to al-Qaida, it has the means to launch a bloody terrorist campaign against U.S. interests in several continents, and in the United States itself.

Though neither Iran nor Hizballah are known to have directly targeted U.S. personnel or interests since the 1996 Khobar Towers bombing, Iran is keeping its options open: Iranian agents surveil U.S. personnel and installations from time to time, and Hizballah retains a significant presence and support infrastructure in the United States that could be used to mount terrorist attacks on the United States.[20] Moreover, U.S. officials recently claimed that al-Qaida officials in Iran were involved in the planning for the May 2003 bombings of three residential compounds in Riyadh, Saudi Arabia, that killed 25 (not including the nine bombers).[21] Thanks to its ties to Hizballah and al-Qaida, as well as its own intelligence assets, Iran could inspire or initiate attacks on U.S. interests in the Middle East, Europe, South America, and in the United States, were it to decide to do so.

CONCLUSIONS

For a variety of reasons, the Israeli raid on Osiraq was a unique case, characterized by conditions that are unlikely to be replicated again elsewhere. Preventive action by the United States against Iran's nuclear program today would have to contend with intelligence, military-technical, and political challenges more daunting than those faced by Israel in 1991.

Successful U.S. prevention would require exceptionally complete intelligence; near flawless military execution; and deft post-strike diplomacy to mitigate an anti-American nationalist backlash, deter retaliation, and, most importantly, ensure that military action does not poison pro-American sentiment or derail the movement for political change in Iran. The complex, daunting, and somewhat contradictory nature of these challenges (e.g., successful prevention could harm short-term prospects for political change and complicate long-term prospects for rapprochement with a new Iran) only underscores the importance of exhausting diplomatic options before giving serious consideration to military action.

Washington, moreover, must supplement these efforts with a serious push to halt North Korea's nuclear program and to prevent North Korea from emerging as a nuclear supplier to Iran, lest North Korea obtain the means to undo the nonproliferation efforts of the international community in Iran.

Nonetheless, preventive action must remain "on the table" as an option, both as a spur to diplomacy by the international community, and out of a recognition that there might arise certain circumstances in the future in which preventive action might become a viable option: should the United States obtain an intelligence windfall regarding Iran's nuclear program that provides it with a complete and detailed picture of the program; should sabotage/covert action become possible as a result of the recruitment of well-placed agents; or should Iran be found responsible for encouraging or commissioning an act of anti-U.S. terrorism that results in significant loss of U.S. life. Under such circumstances, the United States might be inclined to hit Iran's nuclear infrastructure, as part of a broader retaliatory action against terrorist-related facilities in Iran.

ENDNOTES - CHAPTER 7

1. For more details, see Major General David Ivri, "The Attack on the Iraqi Nuclear Reactor: June 1981," in *The War Against Terror* (Hebrew), Tel Aviv: Revivim, 1988, pp. 31-35.

2. The raid, however, failed to eliminate Iraq's pool of scientific expertise, which was rechanneled into efforts to enrich uranium after the Osiraq raid. It also failed to destroy the highly enriched uranium (HEU) reactor fuel that Iraq later hoped to use in its crash program to build a nuclear weapon after it invaded Kuwait in 1990.

3. It should be noted that Iran knows about the vulnerability of nuclear reactors to air attack from direct experience. In September 1980, in the opening days of the Iran-Iraq War, it unsuccessfully attacked Iraq's Osiraq reactor, and subsequently sustained several successful Iraqi attacks on the Bushehr nuclear power plant in 1985 and 1987.

4. *MidEast Mirror*, January 24, 1991, p. 27; Khidhir Hamza, *Saddam's Bombmaker*, New York: Scribner, 2000, pp. 129-130.

5. For more on the implications of a nuclear Iran, see Michael Eisenstadt, "Living with a Nuclear Iran?" *Survival*, Vol. 41, No. 3, Autumn 1999, pp. 124-148; and Kori N. Schake and Judith S. Yaphe, *The Strategic Implications of a Nuclear-Armed Iran*, Washington, DC: National Defense University, Institute for National Strategic Studies, 2001, McNair Paper No. 64.

6. Presumably, this will be contingent on Tehran agreeing to Moscow's conditions for the transfer of the fuel, which are that Iran will: 1) return spent fuel

to Russia for reprocessing, and 2) sign an additional protocol with the IAEA that will give the latter more effective and intrusive means to monitor Iran's nuclear activities.

7. J. Carson Mark, "Reactor Grade Plutonium's Explosive Properties,", Washington, DC: Nuclear Control Institute, August 1990, 6 pp; Department of Energy Factsheet, "Additional Information Concerning Underground Nuclear Weapon Test of Reactor-Grade Plutonium," at *http://ccnr.org/plute_bomb.html*; Harmon W. Hubbard, "Plutonium from Light Water Reactors as Nuclear Weapon Material," April 2003, at *http://www.npec-web.org/projects/hubbard.pdf*.

8. Director General of the IAEA, *Implementation of the NPT Safeguards Agreement in the Islamic Republic of Iran*, GOV/2003/40, June 6, 2003.

9. Mark Hibbs, "AEOI President Told IAEA Last Week Iran Aims to Construct CANDU PHWRs," *Nuclear Fuel*, May 12, 2003, p. 19.

10. Mark Hibbs, "U.S. Concluded by Early 1990s Iran Bought Centrifuge Know-How," *Nuclear Fuel*, February 3, 2003, p. 3; Mark Hibbs, "Iran Obtained Enrichment Know-How from Pakistan, Intelligence Says," *Nucleonics Week*, January 16, 2003, pp. 1, 12; Mark Hibbs, "Pakistan Believed Design Data Source for Centrifuges to Be Built by Iran," *Nuclear Fuel*, January 20, 2003, pp. 1, 14-16; Douglas Frantz, "Iran Closes in on Ability to Build a Nuclear Bomb," *Los Angeles Times*, August 4, 2003, p. A1.

11. AP, "Iran Sites Linked to Weapons," *The Washington Post*, July 9, 2003, p. A23.

12. Nonproliferation Policy Education Center, "Beyond the Agreed Framework: The DPRK's Projected Atomic Bomb Making Capabilities, 2002-09," December 3, 2002, at *www.npec-web.org/projects/fissile2.htm*.

13. It is worth noting that after the destruction of Osiraq, Iraq investigated the possibility of building a nuclear power plant underground—as a protective measure—and Belgian, French, Finnish, Italian, and Soviet companies were asked to assess the viability of such a project. Iraq allegedly abandoned this approach in 1983 after determining that the costs of going underground were "astronomical." S/26333, "Consolidated Report on the Twentieth and Twenty-First IAEA On-Site Inspections in Iraq Under Security Council Resolution 687, 1991)," August 20, 1993, p. 14. Iraq, however, apparently approached China shortly thereafter regarding the purchase of an above-ground nuclear power plant. According to a declassified U.S. Army document, principle considerations relating to site selection for such a reactor included—not surprisingly— "defensibility . . . from possible attacks" and "ability to camouflage from satellites." Michael Knapik, "U.S. Document Says China Studied Building Iraq a Power Reactor," *Nucleonics Week*, July 4, 1991.

14. On the challenges of detecting clandestine nuclear facilities and activities by technical means, see Anthony Fainberg, *Strengthening IAEA Safeguards: Lessons from Iraq*, Center for International Security and Arms Control, Stanford University, April 1993, pp. 20-41.

15. Karl Vick, "Iranians Assert Right to Nuclear Weapons: Issue Unites Conservatives, Reformers," *The Washington Post*, March 11, 2003, p. A16.

16. Here, it is worth noting that Israel is believed to have undertaken a series of covert operations against Iraq's nuclear program prior to the strike on Osiraq. These actions included the destruction of the Osiraq reactor's core by saboteurs as it awaited shipment from the French port of La Seine-sur-Mer near Toulon in April 1979, and the murder in Europe of an Egyptian-born scientist and several Iraqi scientists associated with the nuclear program the following year. Ultimately, covert action did not obviate the need for overt military action to take out the Osiraq reactor.

17. David Albright and Corey Hinderstein, "Iran: Furor Over Fuel," *Bulletin of the Atomic Scientists*, May/June 2003, Vol. 59, No. 3, pp. 12-15, at *http://www.thebulletin.org/issues/2003/mj03/mj03albright.html*.

18. See, for instance: Clifford Beal, Mark Hewish, and Leland Ness, "Hard Target Attack: Forging a Better Hammer," *International Defense Review*, Vol. 29, July 1996, pp. 32-38; Lieutenant Colonel Eric M. Sepp, *Deeply Buried Facilities: Implications for Military Operations*, Air War College Center for Strategy and Technology Occasional Paper No. 14, May 2000, at *http://www.au.af.mil/au/awc/awcgate/cst/csat14.pdf*.

19. Prepared testimony on the "Global Threat" by Vice Admiral Lowell E. Jacoby, USN, Director, Defense Intelligence Agency, before the Senate Select Committee on Intelligence, February 11, 2003, and the Senate Armed Services Committee, February 12, 2003.

20. Statement of Robert S. Mueller III, Director, Federal Bureau of Investigation, before the U.S. Senate Select Committee on Intelligence, February 11, 2003, at: *www.usembassy.it/file2003_02/alia/A3021103.htm*.

21. Dana Priest and Susan Schmidt, "Al-Qaida Figure Tied to Riyadh Blasts; U.S. Officials Say Leader is in Iran with Other Terrorists," *The Washington Post*, May 18, 2003, p. A1.