



Center for Strategic and International Studies

Arleigh A. Burke Chair in Strategy

1800 K Street, N.W. • Suite 400 • Washington, DC 20006

Phone: 1 (202) 775-3270 • Fax: 1 (202) 457-8746

Web: <http://www.csis.org/burke>

Israeli and US Strikes on Iran: A Speculative Analysis

Anthony H. Cordesman

Arleigh A. Burke Chair in Strategy

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Israeli and US strikes on Iran

Israel and the US differ over the timing and level of risk posed by Iran's nuclear efforts. The US sees a mature or serious Iranian nuclear threat as coming well after 2010. Israel claims to see it as coming as early as 2009 -- although much of this may be Israeli hype designed to push the US into diplomatic action, and military action if that fails.

Official US policy is to leave all options on the table, and emphasize diplomatic activity through the EU3 and the UN. The US estimates of timelines for Iran's nuclear and missile efforts also leave at least several years in which to build an international consensus behind sanctions and diplomatic pressure, and a consensus behind military options if diplomacy fails.

The US would also have the potential advantage of finding any Iranian “smoking gun,” improving its targeting and strike options, and being able to strike targets in which Iran had invested much larger assets. The fact Iran can exploit time as a weapon in which to proliferate, does not mean that the US cannot exploit time as a weapon with which to strike Iran.

Israel, on the other hand, sees Iran as an existential threat. A single strike on Tel Aviv and/or Haifa would raise major questions about Israel's future existence.

The Problem of Targeting

There are no risk-free military options for Israel, the US or neighboring states. Tehran's known nuclear research facilities are dispersed around the country, generally large, and have constant new construction. Many key sites are underground and many others may be unknown or are not identifiable. IAEA inspections have identified at least 18 sites, but others argue that there might be more than 70. A great deal of the equipment other than major centrifuge facilities is also easy to move or relocate. Iran may already be playing a shell game with key research facilities and equipment, constantly changing the targeting pattern.

Tehran has had a quarter of a century to learn from the experience of Israel's attack on Iraq in 1981. Iran may have built redundant sites, underground facilities, and constructed high level of protection around its known nuclear research centers. Others have argued that Iranian nuclear sites may have been deliberately built near populated areas or in facilities with many other “legitimate” purposes so Israel and the US would be confronted with the problem of collateral damage or being charged with having hit an “innocent target.” The previous chapters have also strongly suggested that many of Iran's research, development, and production activities are almost certainly modular and can be rapidly moved to new sites, including tunnels, caves, and other hardened facilities.

US and Israeli officials have publicly identified key nuclear research sites that may have been placed underground to shield them against airborne assaults. For example, the US identified the Parchin military complex, located south of Tehran, as a “probable” location for nuclear weaponization research. This site alone has many sections, hundreds of bunkers, and several tunnels. It is also a site that is being used to manufacture conventional armaments and Iranian missiles. This is one possible site that could be attacked, but even the evidence linking this to military nuclear weapons manufacturing were ambiguous. The site has civilian and conventional military use. The IAEA initial assessment was that the site was not linked to nuclear weapons manufacturing, but most agree that there was not definitive proof.

It is equally important to note that Iran had increased its protection of sites against possible US or Israel air strikes. It has been reported that the Islamic Revolutionary Guards Corps (IRGC) launched a program to protect major nuclear facilities. The program was recommended by the Nuclear Control Center of Iran and endorsed by Iran's Supreme Leader, Ali Khamenei. The program's mission was to build a defense infrastructure for Iran's nuclear research facilities.

This program, reportedly coordinated with North Korea, is to build underground halls and tunnels at the cost of “hundreds of millions of dollars.” Some key sites such as Esfahan and Natanz are high on the list of the program to protect. The logistic defense infrastructure would include natural barriers (tunnels into mountains and cliffs), and manufactured barricades (concrete ceilings and multiple floors), and camouflage activities around key sites. The construction, a joint venture between Iranian and North Korean companies, was estimated to finish by June 1, 2006.

Israeli Options

A number of Israeli officers, officials and experts have said that Israel must not permit the Iranians acquire nuclear capabilities, regardless of Tehran's motivations. Some have called for preemptive strikes by Israel. Ephraim Inbar, the President of the Jaffee Center for Strategic Studies, said, “For self-defense, we must act in a pre-emptive mode.”

Senior US officials have warned about this capability. Vice President Richard Cheney suggested on January 20, 2005 that, “Given the fact that Iran has a stated policy that their objective is the destruction of Israel, the Israelis might well decide to act first, and let the rest of the world worry about cleaning up the diplomatic mess afterwards.”

General Moshe Ya'alon, the Israeli Chief of Staff, was quoted as saying in August 2004 that Iran must not be permitted to acquire nuclear weapons. He added that Israel must not rely on the rest of the world to stop Iran from going nuclear because he said a nuclear Iran would change the Middle East where “Moderate States would become more extreme.”

Israeli military officials were quoted in press reports in January 2006, as saying that the IDF got the order to get ready for a military strike against Iranian nuclear sites by March

2006. It is unclear what type of military strikes Israel may choose, if it decides to respond preemptively. Some have argued that Israel may declare its nuclear weapons and establish a "mutually assured destruction: deterrence. While the impact of an Israeli declaration remains uncertain, it is likely to have little impact on Israel's strategic posture in the region, since most states factor Israel's nuclear weapons into their strategic thinking.

Some experts argued that Israel does not have viable military options. They argue it does not have US targeting capability and simply cannot generate and sustain the necessary number of attack sorties. Some argue that Israel might do little more than drive Iranian activity further underground, provoke even more Iranian activity, make it impossible for diplomatic and UN pressure to work, and make Israel into a real, rather than proxy or secondary target.

There is no doubt that such a strike would face problems. Israel does not have conventional ballistic missiles or land/sea-based cruise missiles suited for such a mission. The shortest flight routes would be around 1,500-1,700 kilometers through Jordan and Iraq, 1,900-2,100 kilometers through Saudi Arabia, and 2,600-2,800 kilometers in a loop through Turkey.

Even if Israel had the attack capabilities needed for the destruction of the all elements of the Iranian nuclear program, it is doubtful whether Israel has the kind of intelligence needed to be certain that all the necessary elements of the program were traced and destroyed fully. Israel has good photographic coverage of Iran with the Ofeq series of reconnaissance satellites, but being so distant from Iran, one can assume that other kinds of intelligence coverage are rather partial and weak.

Brig. General, Shlomo Bro has argued that Israel's capabilities may not be enough to inflict enough damage on Iran's nuclear program:

...any Israeli attack on an Iranian nuclear target would be a very complex operation in which a relatively large number of attack aircraft and support aircraft (interceptors, ECM aircraft, refuelers, and rescue aircraft) would participate. The conclusion is that Israel could attack only a few Iranian targets and not as part of a sustainable operation over time, but as a one time surprise operation.

All that said, this does not mean that Israel and the US cannot target and strike much or most of Iran's capabilities. One great danger in open-sourced analysis is that it is not targeting intelligence and cannot provide a meaningful picture of what the US or other potential attackers know at the classified level. It is also dangerous, if not irresponsible, for analysts with no empirical training and experience in targeting and modern weapons effects to make sweeping judgments about strike options. They simply lack basic professional competence and even minimal credibility.

Israel could launch and refuel two-three full squadrons of 36 to 54 combat aircraft for a single set of strikes with refueling. It could use either its best F-15s (28 F-15C/D, 25 F-15I Ra'am or part of its 126 F-16CDs and 23 F-16I Sufas. It has at least three specially

configured squadrons with conformal fuel tanks specially designed for extended range use. It could add fighter escorts, but refueling and increased warning and detection would be major problems.

For the purposes of guessing at how Israeli might attack, its primary aircraft would probably be the F-15I, although again this is guesswork. Global Security has excellent reporting on the F15I.

(<http://www.globalsecurity.org/military/world/israel/f-15i-specs.htm>)

The key aspects are that Boeing's (formerly McDonnell Douglas) F-15E Strike Eagle entered service with the IDF/Heyl Ha'Avir (Israeli Air Force) in January of 1998 and was designated the F-15I Ra'am (Thunder). The F-15E Strike Eagle is the ground attack variant of the F-15 air superiority fighter, capable of attacking targets day or night, and in all weather conditions.

The two seat F-15I, known as the Thunder in Israel, incorporates new and unique weapons, avionics, electronic warfare, and communications capabilities that make it one of the most advanced F-15s. Israel finalized its decision to purchase 25 F-15Is in November 1995. The F-15I, like the US Air Force's F-15E Strike Eagle, is a dual-role fighter that combines long-range interdiction with the Eagle's air superiority capabilities. All aircraft are to be configured with either the F100-PW-229 or F110-GE-129 engines by direct commercial sale; Night Vision Goggle compatible cockpits; an Elbit display and sight helmet (DASH) system; conformal fuel tanks; and the capability to employ the AIM-120, AIM-7, AIM-9, and a wide variety of air-to-surface munitions.

Though externally the Ra'am looks similar to its USAF counterpart, there are some differences, mainly in the electronic countermeasures gear and the exhaust nozzles. The Ra'am has a counterbalance on the port vertical stabilizer instead of the AN/ALQ-128 EWWS (Electronic Warfare Warning System) antenna found on USAF Strike Eagles. The Ra'am uses two AN/ALQ-135B band 3 antennas, one mounted vertically (starboard side) and one horizontally (port side). These are located on the end of the tail booms. They are distinguished by their chiseled ends, unlike the original AN/ALQ-135 antenna, which is round and located on the port tail boom of USAF Eagles.

The Ra'am utilizes extra chaff/flare dispensers mounted in the bottom side of the tail booms. Unlike USAF Eagles, the Ra'am still use engine actuator covers (turkey feathers) on their afterburner cans. The U.S. Air Force removed them because of cost and nozzle maintenance, though curiously, USAF F-16s still have their actuator covers installed. Israeli Strike Eagles and some USAF Eagles based in Europe use CFT air scoops. These scoops provide extra cooling to the engines.

The 25 F-15Is operational since 1999 [and the 100 F-16Is] were procured first and foremost to deal with the Iranian threat. In August 2003 the Israeli Air Force demonstrated the strategic capability to strike far-off targets such as Iran [which is 1,300 kilometers away], by flying three F-15 jets to Poland 1,600 nautical miles away. After they celebrated that country's air force's 85th birthday, on their return trip, the IAF warplanes staged a fly-past over the Auschwitz death camp.

Israeli aircraft would probably need to carry close to their maximum payloads to achieve the necessary level of damage against most targets suspected of WMD activity, although any given structure could be destroyed with 1-3 weapons. (This would include the main Bushehr reactor enclosure, but its real-world potential value to an Iranian nuclear program is limited compared to more dispersed and/or hardened targets). At least limited refueling would be required, and back-up refueling and recovery would be an issue.

They key weapon to be used against hard targets and underground sites like Natanz might be the GBU-28, although the US may have quietly given Israel much more sophisticated systems or Israel may have developed its own, including a nuclear armed variant.

The GBU-28 is carried by the F-15I. It is a "5,000 pound" laser guided bomb with a 4,400-pound earth-penetrating warhead that can be upgraded by the IAF to use electro-optical or GPS targeting. It is a vintage weapon dating back to the early 1990s, and the IAF is reported to have bought at least 100. It has been steadily upgraded since 1991 and the USAF ordered an improved version in 1996.

It looks like a long steel tube with rear fins and a forward guidance module. It can glide some 3-7 miles depending on the height of delivery. It is 153" long X 14.5" in diameter. (photos at <http://www.fas.org/man/dod-101/sys/smart/gbu-28.htm>).

Multiple strikes on the dispersed buildings and entries in a number of facilities would be necessary to ensure adequate damage without restrikes - which may not be feasible for Israel given the limits to its sortie generation capability over even Iranian soft targets. As for hardened and underground targets, the IAF's mix of standoff precision-guided missiles -- such as Harpoon or Popeye - would not have the required lethality with conventional warheads and Israel's use of even small nuclear warheads would cause obvious problems.

Israel may have specially designed or adapted weapons for such strikes, and bought 500 bunker busters from the United States in February 2005. Experts speculated whether the purchase was a power projection move or whether Israel was in fact planning to use these conventional bombs against Iranian nuclear sites. These speculations were further exacerbated with the Israeli Chief of Staff, Lt. General Dan Halutz, was asked how far Israel would go to stop Iran's nuclear program, he said "2,000 kilometers."

The hard target bombs it has acquired from the US are bunker busters, however, are not systems designed to kill underground facilities. They could damage entrances but not the facilities. What is not known is whether Israel has its own ordnance or has secretly acquired the more sophisticated systems described later.

Its main problem would be refueling -- its 5 KC-130H and 5 B-707 tankers are slow and vulnerable and would need escorts -- and its ordinary B-707 AE&W, ELINT and electronic warfare aircraft are also slow fliers, although the new G-550 Shaved ELINT aircraft is a fast flier and the IAF has some long-range unmanned aerial vehicles (UAVs) that could support its aircraft, before, during, and after such missions.

The big manned "slow fliers" would have serious problems penetrating and surviving in Iranian air space. Israel has, however, specially configured some of its F-15s and F-16s with targeting, EW, SAM-suppression aids, and ELINT for this kind of mission. The full details of such capabilities are unknown.

Repeated strikes would be a problem because Israel could probably get away with going through Jordan and then through Saudi Arabia/Gulf or Iraq once, but any repeated effort would be too politically dangerous for Arab governments to easily tolerate. Israel has also had problems with its intelligence satellites and its battle damage assessment and time-urgent retargeting capabilities for precision strikes with a target mix as complex as Iran's could be a major problem.

Much would depend on just how advanced Israel's long-range UAV capabilities really are and whether Israel could get access to US intelligence and IS&R capabilities for both its initial targeting and restrikes, but confirming the actual nature of damage, carrying out restrikes, and sending a clear signal that Israel can repeat its strikes if Iran rebuilds or creates new facilities would be a problem.

The radars in the countries involved would probably detect all IAF and US missions relatively quickly, and very low-altitude penetration profiles would lead to serious range-payload problems. The countries overflown would be confronted with the need to either react or have limited credibility in claiming surprise. An over flight of Iraq would be seen in the region as having to have had a US "green light."

Iran would almost certainly see Jordanian, Turkish, and/or Saudi tolerance of such an IAF strike as a hostile act. It might well claim a US "green light" in any case in an effort to mobilize hostile Arab and Muslim (and possibly world) reactions.

Many have compared current Israeli military options with Iran to that of the 1981 attack against Iraq's Osiraq reactor, and have noted the conditions are very different. For example, Peter Brookes, a military expert, argued that have argued that Israel has several options including satellite-guided JDAM bombs, cruise missiles on submarines, and Special Operation Forces. He, however, argued that attacking Iranian nuclear facilities are "much tougher" to target given the nature of the Iranian nuclear facilities and the strategic balance in the region.

Covert action demands different kinds of operational capabilities and intelligence. There is no indication that Israel has capabilities of covert operations in Iran. The recent information about the development of the Iranian program indicated that it reached a status of being independent of external assistance. Moreover, the assistance Iran got was mostly from Pakistan, another place that is not a traditional area of operations for the Israeli secret services, like Europe or South America. It seems that there is no real potential for covert Israeli operations against the Iranian Nuclear program.

Iranian Defense Against Israel and US Strikes

Iran would find it difficult to defend against US forces using cruise missiles, stealth aircraft, stand-off precision weapons, and equipped with a mix of vastly superior air combat assets and the IS&R assets necessary to strike and restrike Iranian targets in near real time.

Iran might be able to intercept Israeli fighters, Iran has "quantity," but its air defenses have little "quality." It has assigned some 12,000-15,000 men in its air force to land-based air defense functions, including at least 8,000 regulars and 4,000 IRGC personnel. It is not possible to distinguish clearly between the major air defense weapons holdings of the regular air force and IRGC, but the air force appeared to operate most major surface-to-air missile systems.

Total holdings seem to include 30 Improved Hawk fire units (12 battalions/150+ launchers), 45-55 SA-2 and HQ-2J/23 (CSA-1) launchers (Chinese-made equivalents of the SA-2), and possibly 25 SA-6 launchers. The air force also had three Soviet-made long-range SA-5 units with a total of 10-15 launchers-enough for six sites. Iran has developed and deployed its own domestically manufactured SAM dubbed the Shahab Thaqeb. The SAM requires a four-wheeled trailer for deployment and closely resembles the R440 SAM.

Iran's holdings of lighter air defense weapons include five Rapier squadrons with 30 Rapier fire units, 5-10 Chinese FM-80 launchers, 10-15 Tigercat fire units, and a few RBS-70s. Iran also holds large numbers of man-portable SA-7s, HN-5s, and SA-14s, plus about 2,000 anti-aircraft guns -- including some Vulcans and 50-60 radar-guided and self propelled ZSU-23-4 weapons. It is not clear which of these lighter air defense weapons were operated by the army, the IRGC, or the air force. The IRGC clearly had larger numbers of manportable surface-to-air launchers, including some Stingers that it had obtained from Afghanistan. It almost certainly had a number of other light air defense guns as well.

There are no authoritative data on how Iran deploys air defenses, but Iran seems to have deployed its new SA-5s to cover its major ports, oil facilities, and Tehran. It seems to have concentrated its Improved Hawks and Soviet and Chinese-made SA-2s around Tehran, Isfahan, Shiraz, Bandar Abbas, Kharg Island, Bushehr, Bandar Khomeini, Ahwaz, Dezful, Kermanshah, Hamadan, and Tabriz.

Although Iran has made some progress in improving and updating its weapons, sensors, and electronic warfare capability, and has learned much from Iraq's efforts to defeat US enforcement of the "no-fly zones" from 1992-2003, its defenses are outdated and poorly integrated. All of its major systems are based on technology that is now more than 35 years old, and all are vulnerable to US use of active and passive countermeasures.

Iran's land-based air defense forces are too widely spaced to provide more than limited air defense for key bases and facilities, and many lack the missile launcher strength to be fully effective. This is particularly true of Iran's SA-5 sites, which provide long-range, medium-to-high altitude coverage of key coastal installations. Too few launchers are scattered over too wide an area to prevent relatively rapid suppression. Iran also lacks the low altitude radar coverage, overall radar net, command and control assets, sensors, resistance to sophisticated jamming and electronic countermeasures, and systems integration capability necessary to create an effective air defense net.

The Iranian air force has 14 main combat squadrons. These include nine fighter ground-attack squadrons, four with at least 65 U.S.-supplied F-4D/Es, four with at least 60 F-5E/F, and one with 30 Soviet-supplied Su-24MK, 13 Su-25K, and 24 French F-1E Mirage aircraft. Iran possesses some MiG-29, Su-25K and -24MK, and Mirage F-1E Iraqi aircraft it seized during the Gulf War. How many of these are operational is not known.

Some reports indicate that Iran ordered an unknown number of TU-22M-3 “Backfire C” long-range strategic bombers from either Russia or the Ukraine. While such discussions do seem to have taken place, no purchases or deliveries can be confirmed. There have been rumors that Iran might have Su-30 fighter aircraft, however, such reports have not been confirmed by official Iranian or Western sources. Another source reports that China may supply 90 FC-1 and 60 J-10/F-10 aircraft to Iran. China’s ability to export such aircraft in the near term is uncertain, given the needs of its own forces, however, and it is unclear that China would provoke the Us by making such a sale.

Iran has five fighter squadrons, two with 25 U.S.-supplied F-14s each, two with 25–30 Russian/Iraqi-supplied MiG-29A/-UBs, and one with 24 Chinese supplied F-7Ms. The Iranian Air Force has a small reconnaissance squadron with 6 RF-4E Phantom Aircraft. It has 1 RC-130, and other intelligence/reconnaissance aircraft, together with large numbers of transports and helicopters.

Most Iranian squadrons can perform both air defense and attack missions, regardless of their principal mission—although this does not apply to Iran’s F-14 (air defense) and Su-24 (strike/attack) units. Iran’s F-14s were, however, designed as dual-capable aircraft, and it has not been able to use its Phoenix air-to-air missiles since the early 1980s. Iran has claimed that it is modernizing its F-14s by equipping them with Improved Hawk (I-Hawk) missiles adapted to the air-to-air role, but it is far from clear that this is the case or that such adaptations can have more than limited effectiveness. In practice, this means that Iran might well use the F-14s in nuclear strike missions. They are capable of long-range, high payload missions and would require minimal adaptation to carry and release a nuclear weapon.

Reportedly, Iran has acquired spare parts for F-14 aircraft from U.S. overstock through intermediaries. As a consequence, the U.S. Defense Logistics Agency tightened its supervision of surplus goods sales. One source states that, although Iran claims to being able to produce up to 70% of all F-14 parts indigenously, it is questionable if Iran can keep more than 30 F-14 aircraft serviceable.

Iran's air forces are only marginally better able to survive in air-to-air combat than Iraq's were before 2003. Its land-based air defenses must operate largely in the point defense mode, and Iran lacks the battle management systems and data links are not fast and effective enough to allow it to take maximum advantage of the overlapping coverage of some of its missile systems—a problem further complicated by the problems in trying to net different systems supplied by Britain, China, Russia, and the US. Iran's missiles and

sensors are most effective at high-to-medium altitudes against aircraft with limited penetrating and jamming capability.

Iranian Retaliation Against Israel

As is the case with a US strike, Iran has the capabilities to strike back against Israel. In fact, it has threatened retaliation if attacked by Israel. The Iranian Foreign Minister, Manouchehr Mottaki, was quoted as saying that an attack by Israel or the US would have “severe consequence,” and threatened that Iran would retaliate “by all means” at its disposal. Mottaki added: “Iran does not think that the Zionist regime is in a condition to engage in such a dangerous venture and they know how severe the possible Iranian response will be to its possible audacity...Suffice to say that the Zionist regime, if they attack, will regret it.”

Iran has several options to respond to an Israeli attack:

1. Multiple launches of Shahab-3 including the possibility of CBR warheads against Tel Aviv, Israeli military and civilian centers, and Israeli suspected nuclear weapons sites.
2. Escalate the conflict using proxy groups such Hezbollah or Hamas to attack Israel proper with suicide bombings, covert CBR attacks, and missile attacks from southern Lebanon and Syria.
3. Covert attacks against Israeli interests by its intelligence and IRGC assets. This could include low-level bombings against Israeli embassies, Jewish centers, and other Israeli assets outside and inside Israel.

In addition, any Israeli military option would have to include an air strike and would seriously can complicate Israel's fragile relations with Jordan and may provoke Saudi Arabia to respond. An Israeli strike against Iranian nuclear facilities may also strengthen the Iranian regime's stance to move toward nuclear capabilities, and drive many neighboring states to support Iran's bid for nuclear weapons. In addition, it could lead to further escalation of the Iraqi insurgency and increase the threat of asymmetric attacks against America interests and allies in the region.

On the other hand, Israeli officials have expressed the concern that if Iran acquires nuclear weapons and the means to deliver them, this spark further proliferation in the region. This would spread WMD capabilities around the Middle East, and greatly increase the threat of CBRN attacks against Israel and the entire region. Waiting also have its penalties.

US Options Against Iran

A power as large as the US would have far more capability than Israel. It could strike at possible targets as well as confirm targets. The problem with a shell gamer is that it virtually provokes strikes at all the shells.

The US also could strike at a wide range of critical Iranian military facilities, including its missile production facilities. Most are soft targets, and would be extremely costly to Iran. Even if many of Iran's nuclear facilities did survive US strikes, Iran would be faced with

either complying with the EU3 and UN terms or taking much broader military losses -- losses its aging and limited forces can ill afford.

Military operations against Iran's nuclear, missile, and other WMD facilities and forces would be difficult for Israel and challenging for the US. Iran would find it difficult to defend against US forces using cruise missiles, stealth aircraft, stand-off precision weapons, and equipped with a mix of vastly superior air combat assets and the IS&R assets necessary to strike and restrike Iranian targets in near real time. For example, each US B-2A Spirit stealth bomber could carry eight 4,500-pound enhanced BLU-28 satellite-guided bunker-busting bombs-potentially enough to take out one hardened Iranian site per sortie. Such bombers could operate flying from Al Udeid air base in Qatar, Diego Garcia in the Indian Ocean, RAF Fairford in Gloucestershire, United Kingdom, and Whiteman US Air Force (USAF) Base in Missouri.

The United States has a wide range of other hard target killers, many of which are in development or classified. Systems that are known to be deployed include the BLU-109 Have Void "bunker busters," a "dumb bomb" with a maximum penetration capability of four to six feet of reinforced concrete. An aircraft must overfly the target and launch the weapon with great precision to achieve serious penetration capability. It can be fitted with precision guidance and converted to a guided glide bomb.

There seems to be a follow-on version of the 2,000-pound BLU-109, with an advanced unitary penetrator that can go twice as deep as the original BLU-109. Newest development is 5,000-pound BLU-122, which is supposed to be operational in 2007. Further, there is the Massive Ordnance Penetrator (MOP), weighing almost 30,000 pounds, carrying 5,300 pounds of explosives. According to some estimates optimum penetrating distance is up to 200 feet. Possible alternative: directed energy and high-power microwave (HPM) testing phase.

The Joint Direct Attack Munition (JDAM) GBU-31 version has a nominal range of 15 kilometers with a CEP of 13 meters in the GPS-aided Inertial Navigation System (INS) modes of operation and 30 meters in the INS-only modes of operation.

More advanced systems that have been publicly discussed in the unclassified literature include the BLU-116 Advanced Unitary Penetrator (AUP), the GBU-24 C/B (USAF), or the GBU-24 D/B (US Navy), which has about three times the penetration capability of the BLU-109. US is investing in weapons that are supposed to destroy targets that are buried under more than 20 meters of dirt and concrete.

It is not clear whether the United States has deployed the AGM-130C with an advanced earth penetrating/hard target kill system. The AGM-130 Surface Attack Guided Munition was developed to be integrated into the F-15E, so it could carry two such missiles, one on each inboard store station. It is a retargetable, precision-guided standoff weapon using inertial navigation aided by GPS satellites and has a 15-40-NM range.

The United States does, however, have a number of other new systems that are known to be in the developmental stage and can probably deploy systems capable of roughly twice the depth of penetration with twice the effectiveness of the systems known from its attacks on Iraq in 1991. The nature and characteristics of such systems are classified but the newest development in the BLU-series that has been open reported is the 5,000-pound BLU-122, which is supposed to be operational in 2007. Further, there is the Massive Ordnance Penetrator (MOP), weighing almost 30,000 pounds and able to carry 5,300 pounds of explosives. According to some estimates optimum penetrating distance for the MOP is up to 200 feet. A possible alternative to these weapons are directed-energy and high-power microwave (HPM) weapons, none of which are currently beyond testing phase.

It is not clear whether such weapons could destroy all of Iran's most hardened underground sites, although it seems likely that the BLU-28 could do serious damage at a minimum. Much depends on the accuracy of reports that Iran has undertaken a massive tunneling project with some 10,000 square meters of underground halls and tunnels branching off for hundreds of meters from each hall.

Iran is reported to be drawing on North Korean expertise and to have created a separate corporation (Shahid Rajaei Company) for such tunneling and hardening efforts under the IRGC, with extensive activity already under way in Natanz and Isfahan. The facilities are said to make extensive use of blast-proof doors, extensive divider walls, hardened ceilings, 20-centimeter-thick concrete walls, and double concrete ceilings with earth filled between layers to defeat earth penetrates. Such passive defenses could have a major impact, but reports of such activity are often premature, exaggerated, or report far higher construction standards than are actually executed.

At the same time, the B-2A could be used to deliver large numbers of precision-guided 250 and 500-pound bombs against dispersed surface targets or a mix of light and heavy precision-guided weapons. Submarines and surface ships could deliver cruise missiles for such strikes, and conventional strike aircraft and bombers could deliver standoff weapons against most suspect Iranian facilities without suffering a high risk of serious attrition. The challenge would be to properly determine what targets and aim points were actually valuable, not to inflict high levels of damage.

On analyst projects that strikes against some 400 targets would be necessary to dismantle the program. According to other reports, the U.S. Department of Defense is considering both conventional and nuclear weapons to use against reinforced underground targets, and would strike at Iran's other WMD facilities, missiles and missile production facilities, and create an entry corridor by destroying part of Iran's air defense system. This could easily require 800-1,200 sorties and cruise missile strikes.

More generally, the US could cripple Iran's economy by striking at major domestic gas production and distribution facilities, refineries, and electric power generations. There are no rules that would preclude the US from immediate restrikes or restrikes over time. If the US chose to strike at the necessary level of intensity, it could use conventional

weapons to cripple Iran's ability to function as a nation in a matter of days with attacks limited to several hundred aim points.

Possible US War Plans: Attacking, Delaying, and Waiting Out

If the US does choose to respond militarily, it has several major types of military and strategic options. Each of these options might have many of the following broad characteristics, although it should be stressed that these are only rough outlines of US options and are purely speculative and illustrative points. They are more warnings than recommendations, and they are not based on any inside knowledge of actual US war plans, and calculations. Those who argue strongly for and against such options should note, however, that there are many different ways in which the US could act. There are no rules or certainties that either say such attacks could not succeed or that they would.

Demonstrative, Coercive, or Deterrent Strikes

1. Conduct a few cruise missile or stealth strikes simply as a demonstration or warning of the seriousness of US intentions if Iran does not comply with the terms of the EU3 or UN.
2. Hit at least one high value target recognized by IAEA and EU3 to show credibility to Iran, minimize international criticism.
3. Might strike at new sites and activities to show Iran cannot secretly proceed with, or expand its efforts, by ignoring the UN or EU3.
4. Could carrier base; would not need territory of Gulf ally.
5. International reaction would be a problem regardless of the level of US action.
6. Might trigger Iranian counteraction in Iraq, Afghanistan, and dealing with Hezbollah.

Limited US attacks:

1. Limited strike would probably take 16-20 Cruise missile and strike sorties. (Total sorties in Gulf and area would probably have to total 100 or more including escorts, enablers, and refuelers.
2. Might be able to combine B-2s and carrier-based aircraft and sea-launched cruise missiles. Might well need land base(s) in Gulf for staging, refueling, and recovery.
3. Goal would be at least 2-3 of most costly and major facilities critically damaged or destroyed.
4. Hit at high value targets recognized by IAEA and EU3 to show credibility to Iran, minimize international criticism.
5. Might strike at new sites and activities to show Iran cannot secretly proceed with, or expand its efforts, by ignoring the UN or EU3.

6. Might slow down Iran if used stealth aircraft to strike at hard and underground targets, -but impact over time would probably still be more demonstrative than crippling.
7. Hitting hard and underground targets could easily require multiple strikes during mission, and follow-on restrikes to be effective.
8. Battle damage would be a significant problem, particularly for large buildings and underground facilities.
9. Size and effectiveness would depend very heavily on the quality of US intelligence, and suitability of given ordnance, as well as the time the US sought to inflict a given effect.
10. Iran's technology base would survive; the same would be true of much of equipment even in facilities hit with strikes. Little impact, if any, on pool of scientists and experts.
11. Iranian response in terms of proliferation could vary sharply and unpredictably: Deter and delay vs. mobilize and provoke.
12. Likely to produce cosmetic Iranian change in behavior at best. Would probably make Iran disperse program even more, and drive it to deep underground facilities. Might provoke to implement (more) active biological warfare program.
13. Any oil embargo likely to be demonstrative.
14. Would probably trigger Iranian counteraction in Iraq, Afghanistan, and dealing with Hezbollah.
15. International reaction could be a serious problem; US might well face same level of political problems as if it had launched a comprehensive strike on Iranian facilities.

Major US attacks on Iranian CBRN and major missile targets:

1. 200-600 cruise missiles and strike sorties; would have to be at least a matching number of escorts, enablers, and refuelers. Period of attacks could extend from 3 to 10 days.
2. Hit all suspect facilities for nuclear, missile, BW, and related C4IBM.
3. Knock out key surface-to-air missile sites and radars for future freedom of action
4. Would need to combine B-2s, carrier-based aircraft and sea-launched cruise missiles, and used of land base(s) in Gulf for staging, refueling, and recovery.
5. Threaten to strike extensively at Iranian capabilities for asymmetric warfare and to threaten tanker traffic, facilities in the Gulf, and neighboring states.
6. At least 7-10 days to fully execute and validate.
7. Goal would be at least 70-80% of most costly and major facilities critically damaged or destroyed.
8. Hit at all high value targets recognized by IAEA and EU3 to show credibility to Iran, minimize international criticism, but also possible sites as well.
9. Strike at all known new sites and activities to show Iran cannot secretly proceed with, or expand its efforts, unless hold back some targets as hostages to the future.

10. Impact over time would probably be crippling, but Iran might still covertly assemble some nuclear device and could not halt Iranian biological weapons effort.
11. Hitting hard and underground targets could easily require multiple strikes during mission, and follow-on restrikes to be effective.
12. Battle damage would be a significant problem, particularly for large buildings and underground facilities.
13. Size and effectiveness would depend very heavily on the quality of US intelligence and suitability of given ordnance, as well as the time the US sought to inflict a given effect.
14. Much of Iran's technology base would still survive; the same would be true of many equipment items, even in facilities hit with strikes. Some impact, if any, on pool of scientists and experts.
15. Iranian response in terms of proliferation could vary sharply and unpredictably: Deter and delay vs. mobilize and provoke.
16. A truly serious strike may be enough of a deterrent to change Iranian behavior, particularly if coupled to the threat of follow on strikes in the future. It still, however, could as easily produce only a cosmetic Iranian change in behavior at best. Iran might still disperse its program even more, and shift to multiple, small, deep underground facilities.
17. Might well provoke Iran to implement (more) active biological warfare program.
18. An oil embargo might be serious.
19. Iranian government could probably not prevent some elements in Iranian forces and intelligence from seeking to use Iraq, Afghanistan, support of terrorism, and Hezbollah to hit back at the US and its allies if it tried; it probably would not try.
20. International reaction would be a serious problem, but the US might well face same level of political problems as if it had launched a small strike on Iranian facilities.

Major US attacks on military and related civilian targets:

1. 1000-2,500 cruise missiles and strike sorties
2. Hit all suspect facilities for nuclear, missile, BW, and C4IBM, and potentially "technology base" targets including universities, dual use facilities.
3. Either strike extensively at Iranian capabilities for asymmetric warfare and to threaten tanker traffic, facilities in the Gulf, and neighboring states or threaten to do so if Iran should deploy for such action.
4. Would require a major portion of total US global assets. Need to combine B-2s, other bombers, and carrier-based aircraft and sea-launched cruise missiles. Would need land base(s) in Gulf for staging, refueling, and recovery. Staging out of Diego Garcia would be highly desirable.
5. Would probably take several weeks to two months to fully execute and validate.
6. Goal would be 70-80%-plus of most costly and major CBRN, missile and other delivery systems, key conventional air and naval strike assets, and major military production facilities critically damaged or destroyed.

7. Hit at all high value targets recognized by IAEA and EU3 to show credibility to Iran, minimize international criticism, but also possible sites as well.
8. Strike at all known new sites and activities to show Iran cannot secretly proceed with, or expand its efforts, unless hold back some targets as hostages to the future.
9. Hitting hard and underground targets could easily require multiple strikes during mission, and follow-on restrikes to be effective.
10. Impact over time would probably be crippling, but Iran might still covertly assemble some nuclear device and could not halt Iranian biological weapons effort.
11. Battle damage would be a significant problem, particularly for large buildings and underground facilities.
12. Size and effectiveness would depend very heavily on the quality of US intelligence and suitability of given ordnance, as well as the time the US sought to inflict a given effect.
13. Much of Iran's technology base would still survive; the same would be true of many equipment items, even in facilities hit with strikes. Some impact, if any, on pool of scientists and experts.
14. Iranian response in terms of proliferation could vary sharply and unpredictably: Deter and delay vs. mobilize and provoke.
15. Such a series of strikes might be enough of a deterrent to change Iranian behavior, particularly if coupled to the threat of follow on strikes in the future. It still, however, could as easily produce only a cosmetic Iranian change in behavior at best. Iran might still disperse its program even more, and shift to multiple, small, deep underground facilities.
16. Might well provoke Iran to implement (more) active biological warfare program.
17. An oil embargo might be serious.
18. Iranian government could probably not prevent some elements in Iranian forces and intelligence from seeking to use Iraq, Afghanistan, support of terrorism, and Hezbollah to hit back at the US and its allies if it tried; it probably would not try.
19. International reaction would be a serious problem, and far greater than strikes that could be clearly associated with Iran's efforts to proliferate.

Delay and then strike:

1. The US could execute any of the above options, and wait until after Iran provided proof was proliferating. Such a "smoking gun" would create a much higher chance of allied support, and international tolerance or consensus
2. Iran will have committed major resources, and created much higher value targets
3. The counter-risk is an unanticipated Iranian break out; some form of Iranian launch on warning (LOW), launch under attack (LUA), or survivable "ride out" capability.
4. Iranian dispersal and sheltering may be much better.
5. Iran might have biological weapons as a counter

6. Allied and regional reactions would be uncertain. Time tends to breed tolerance of proliferation.

Ride out Iranian Proliferation:

1. Announce or quietly demonstrate US nuclear targeting of Iran's military and CBRN facilities and cities.
2. Tacitly signal US "green light" for Israeli nuclear retaliation or preemption.
3. Deploy anti-ballistic and cruise missile defenses, and sell to Gulf and neighboring states.
4. Signal US conventional option to cripple Iran by destroying its power generation, gas, and refinery facilities.
5. Provide US guarantees of extended deterrence to Gulf states;
6. Tacitly accept Saudi acquisition of nuclear weapons.
7. Maintain preventive/preemptive option at constant combat readiness. Act without warning.
8. Encourage Israel to openly declare its strike options as a deterrent.
9. Announce doctrine that any Iranian use of biological weapons will lead to nuclear retaliation against Iran.

The "ride out" option is one that many commentators need to consider in more depth. Unless the US does find evidence of an imminent Iranian threat -- which at this point might well require Iran to find some outside source of nuclear weapons or weapons-grade material -- the US may well simply choose to wait. Patience is not always a virtue, but it has never been labeled a mortal sin.

Iranian Retaliation Against US Strikes

This does not mean it would be easy or desirable for the US to exercise its military options. US forces are preoccupied in Iraq, and some believe that the lack of security in Iraq makes a full military attack against Iran all too unlikely. US military options are not risk-free, and the consequences of US strikes are enormous. Tehran has several retaliatory options:

1. Retaliate against US forces in Iraq and Afghanistan overtly using Shahab-3 missiles armed with CBR warheads
2. Use proxy groups including al-Zarqawi and Sadr in Iraq to intensify the insurgency and escalate the attacks against US forces and Iraqi Security Forces
3. Turn the Shi'ite majority in Iraq against the US presence and demand US forces to leave
4. Attack the US homeland with suicide bombs by proxy groups or deliver CBR weapons to al-Qaeda to use against the US

5. Use its asymmetric capabilities to attacks US interests in the region including soft targets: e.g. embassies, commercial centers, and American citizens
6. Attack US naval forces stationed in the Gulf with anti-ship missiles, asymmetric warfare, and mines
7. Attack Israel with missile attacks possibly with CBR warheads
8. Retaliate against energy targets in the Gulf and temporarily shut off the flow of oil from the Strait of Hormuz
9. Stop all of its oil and gas shipments to increase the price of oil, inflict damage on the global and US economies

Iran has close relations with many Iraqi Shi'ites, particularly Shi'ite political parties and militias. Some Iraqi groups have warned against US military strikes against their neighbors. For example, Moqtada Sadr pledged that he would come to the aid of Iran in the case of a military strike by the US against Tehran. Sadr pledged that his militia, the Mahdi army, would come to the aid of Iran. According to Sadr, Iran asked him about what his position would be if Iraq was attacked by the US and he pledged that the Mahdi army would help any Arab or neighboring country if it was attacked.

Many observers argue that a military strike against Iran can add to the chaos in Iraq and may further complicate the US position in Iraq. While the consequences of US military attacks against Iran remain unclear; the Shi'ite majority in Iraq can 1) ask the US to leave Iraq, 2) Shi'ite militia groups directly attack US forces, and/or 3) turn the new Iraqi security and military forces against US forces in Iraq.

Iran has extensive forces suited to asymmetric warfare. It could not close the Strait of Hormuz, or halt tanker traffic, but it could threaten and disrupt it can create a high-risk premium and potential panic in oil markets. Iran could potentially destabilize part of Afghanistan, and use Hezbollah and Syria to threaten Israel.

Iran can also use its IRGC asymmetric warfare assets to attack US interests in the region. Iranian officials do not hide the fact that they would use asymmetric attacks against US interests. For example, a Brigadier General in the IRGC and the commander of the "Lovers of Martyrdom Garrison," Mohammad-Reza Jaafari, threatened US interest with suicide operations if the US were to attack Iran:

Now that America is after gaining allies against the righteous Islamic Republic and wants to attack our sanctities, members of the martyrdom-seeking garrisons across the world have been put on alert so that if the Islamic Republic of Iran receives the smallest threat, the American and Israeli strategic interests will be burnt down everywhere.

The only tool against the enemy that we have with which we can become victorious are martyrdom-seeking operations and, God willing, our possession of faithful, brave, trained and zealous persons will give us the upper hand in the battlefield...

Upon receiving their orders, our martyrdom-seeking forces will be uncontrollable and a guerrilla war may go on in various places for years to come...

America and any other power cannot win in the unbalanced war against us.

Iran could seek to create an alliance with extremist movements like al-Qaeda in spite of their hostility to Shi'ites. It can seek to exploit Arab and Muslim anger against US ties to Israel and the invasion of Iraq on a global level, and European and other concerns that the US might be repeating its miscalculation of the threat posed by Iraq and striking without adequate cause. Unless Iran is far more egregious in its non-compliance, or the US can find a definitive smoking gun to prove Iran is proliferating, Iran would be certain to have some success in such efforts.

Iran's energy resources are another potential weapon. Shutting off exports would deeply hurt Iran but would have an impact on global markets. As Iraq found, energy deals can also sharply weaken support for even diplomatic options, and Russia and China might well oppose any kind of US military strike, regardless of the level of justification the US could advance at the time.