

ISRAEL AND NUCLEAR PROLIFERATION IN THE MIDDLE EAST

Gawdat Bahgat

Dr. Bahgat is director of the Center for Middle Eastern Studies in the Department of Political Science at the Indiana University of Pennsylvania.

Since the late 1960s, Israel has been considered the sixth nation in the world and the first in the Middle East to have acquired a nuclear-weapons capability. An accurate assessment of Israel's nuclear program is almost impossible, given that the Israeli government has never acknowledged making nuclear weapons and has never published any account of its nuclear activities. Thus, most scholarly work relies on non-Israeli sources. These sources give various estimates of the actual size and composition of Israel's nuclear stockpile, but the overall consensus is that Israel possesses an extensive arsenal of nuclear devices and an array of medium-range missiles that could deliver them.

This essay seeks to examine Israel's nuclear program. The argument is three-fold. First, in pursuing a nuclear-weapons capability shortly after the nation was created, Israel had sought to achieve two goals: to deter any attack by its hostile Arab neighbors and to convince these adversaries that, since they could not defeat Israel militarily, they had to accommodate it politically. The goal was to force the Jewish state's enemies to come to the negotiating table and make peace. Former

Prime Minister Shimon Peres articulated this pursuit of national survival: "We didn't build this (nuclear) option to get to Hiroshima, but rather to get to Oslo. We felt that the reason Israel was attacked several times, without any provocation, was because some of our neighbors thought they could overpower us, and we wanted to create a situation in which this temptation would no longer exist."¹

Second, Israeli efforts to develop an indigenous nuclear-weapons capability was driven by deep suspicion of foreign powers' commitment to defend the Jewish people. This suspicion is rooted in the Holocaust, when millions of Jews were killed. This dramatic experience has sharpened the notion of "never again." From the very beginning of the creation of Israel, Israeli politicians decided that their country should be able to project the military capability to protect the Jewish people. As Ariel Sharon once said, "Israel has to have all the elements of power necessary to protect itself independently of outside aid."²

Third, in the foreseeable future, Israel is certain to maintain the nuclear option. Any discussion of dismantling Israeli nuclear weapons is unrealistic until a

genuine peace is established between Israel and its neighbors, including Iran. Such a peace would provide recognition that Israel has become an indispensable part of the Middle East landscape and would ensure that the national survival of the Jewish state was not in doubt.

SECURITY PERCEPTIONS AND CONCERNS

The state of Israel was created shortly after the end of World War II and the defeat of Nazism. Naturally, the tragic experience of the Holocaust had shaped the security perception of the new state. The Holocaust meant, among other things, that the physical survival and existence of the Jewish people was threatened. This conviction has led to the conclusion that Israel should possess the military prowess that would prevent the repetition of such a tragedy. This meant the capability to inflict intolerable pain on its adversaries. Within this context, nuclear weapons would, as Ernst David Bergmann, the first chairman of Israel's Atomic Energy Commission put it, "ensure that we shall never again be led as lambs to the slaughter."³

The 1948 war between Israel and its Arab neighbors heightened this deep concern about the existential threat of complete annihilation of the state. David Ben-Gurion, the first Israeli prime minister, saw the 1948 war, known in Israel as the War of Independence, as the first round of fighting with the Arabs. He was convinced that the cease-fire would merely lead to a cessation of hostilities, not a permanent peace. He believed that Arab states would renew their efforts to annihilate the Jewish state. The geographical characteristics of Israel had further aggravated this sense of vulnerability.

Compared with its adversaries (Arabs and Iranians), Israel's geostrategic configuration suggests at least two sources of vulnerability. First, Israel is a small country along the Mediterranean coast that lacks territorial depth. Second, the country's population is small and overwhelmingly concentrated in a few cities. A successful attack by conventional or non-conventional weapons would pose a serious threat to the survival of the Jewish state. Further aggravating the security perception shortly after Israel was created was the lack of formal security guarantees with any other country. Ben-Gurion "tried but failed to gain a binding American security guarantee."⁴ These potential drawbacks had formulated Ben-Gurion's and other Israeli leaders' strategic thinking. Science, they believed, could close these geostrategic gaps between Israel and its Arab enemies. Building a nuclear-weapons capability would serve as a "great equalizer" and ensure the survival of the Jewish state.

In addition to the imperative role of nuclear weapons in Israel's national security, several parameters of the nation's military doctrine have been articulated. First, Israel's conventional military power should be qualitatively superior to that of its adversaries (individually or collectively).⁵ Second, these adversaries should be denied the nuclear option. Israel should apply all means to prevent Iran or any Arab state from acquiring a nuclear capability. In 2004, a report issued by Project Daniel, a private advisory group to Prime Minister Ariel Sharon, argued, "Today, more than ever before, the state of Israel must include appropriate preemption options in its overall defense strategy."⁶

In short, the Israeli leaders' deep concerns and preoccupations with the

state's survival and the role of nuclear weapons in deterring existential threats are as old as the state itself. They have endured for more than five decades and are not likely to diminish anytime soon.

NON-CONVENTIONAL CAPABILITIES

Little information is available on Israeli chemical and biological capabilities. There are strong indications that, since the early 1950s, Israeli leaders have considered nuclear weapons as the most effective means to ensure the nation's survival and to force Arab states to make peace. Israel's founding fathers, however, understood that acquiring nuclear devices was likely to take many years. Accordingly, chemical and biological weapons were considered as temporary substitutes for the nuclear option. Within this context, an institution called Hemed Beit was created in 1948 and given the responsibility to carry out chemical and biological research relevant to national security.⁷ In 1952, the Hemed Beit was converted into the Israeli Institute of Biological Research.

It is important to point out that Israel does not have a monopoly over chemical and biological weapons in the Middle East. Several Arab countries and Iran are believed to have developed stockpiles of these weapons. These efforts by Arabs and Iranians to acquire such capabilities were initiated partly to match the Israeli programs and partly to give them a strategic deterrence to Tel Aviv's nuclear weapons. Iraq used chemical weapons against Iranian troops and the Iraqi Kurds. Also, it was reported that Egypt and Libya used them in Yemen and Chad, respectively. There are no credible reports that chemical and biological weapons were

used in the Arab-Israeli wars.⁸ Furthermore, despite their horrific psychological impact, most analysts agree that chemical weapons do not constitute an existential threat to Israel.

Unlike chemical and biological weapons, nuclear weapons are the core of Israel's strategic posture and represent the nation's last line of defense. Interestingly, Israel's founding fathers were not united in their stand on building a nuclear-weapons capability. Ben-Gurion, Shimon Peres, Moshe Dayan and Ernst David Bergmann were among the strongest advocates of a nuclear option and played a significant role in transforming this vision into a reality. They shared a strong belief that a nuclear option was fundamental to their nation's security and survival. This belief was based on a number of strategic propositions: 1) An attack by Arab armies was a real threat to Israel; Arab unity under a charismatic leader (such as Gamal Abdel Nasser of Egypt) and fueled by a radical pan-Arab ideology (such as that of the Baath in Syria and Iraq) had further heightened Israel's security concerns. 2) Israel's borders before the 1967 war were not defensible in conventional warfare; Israeli cities and population centers were in the range of Arab weapons. 3) Israel's qualitative military advantages were not enough to overcome the Arabs' qualitative advantages. A nuclear option, it was argued, would provide the Jewish state with the ultimate security guarantees.

Other Israeli leaders did not share the conviction that nuclear weapons would make Israel safer. This early opposition to a nuclear option was not driven by ideological divisions within the Israeli military and political establishment. Rather, the argument for conventional capability and

against nuclear weapons was driven by practical considerations. Israeli leaders such as Yigal Allon, Golda Meir, Yitzhak Rabin and Ariel Sharon argued that Israel's superiority in conventional weapons provided flexible deterrence. Introducing nuclear weapons in the Middle East, they claimed, might spur the Arabs to follow suit and lead to a "balance of terror" between Israel and its Arab adversaries. Such a balance would neutralize Tel Aviv's conventional superiority. Finally, the argument goes, nuclear weapons would come with huge political and financial costs and would contribute little, if anything, to Israel's war against terrorist attacks.⁹

Given this lack of consensus, the decision to initiate a nuclear program was taken in secrecy. Only Ben-Gurion's closest aides participated in making the decision. According to some sources, the prime minister's move to build a nuclear program was made "without the knowledge of the Knesset's foreign-affairs and security committee and without approval of its finance committee."¹⁰ Military and strategic developments in the mid-1950s had substantially influenced the Israeli nuclear choice. In 1955, Egypt announced a large arms deal with Czechoslovakia. This announcement had significant strategic implications. The deal would have greatly improved Egypt's military capability, and as a result would have had the potential to alter the military balance between Cairo and Tel Aviv. In addition, the deal signaled a growing Soviet penetration of the Middle East in support of the Arab side.

Shortly after the announcement of the arms deal, the tension between Egypt and Israel intensified. President Nasser decided to close the Red Sea Straits of Tiran to

Israeli shipping, blockading Israel's port of Eilat, and increased his support to border-area attacks against Israel. Meanwhile, Egypt adopted a hostile stand against British and French interests in the Middle East, including nationalizing the Suez Canal and backing the resistance in Algeria. A coordinated British-French-Israeli attack was carried out on Egypt in 1956. The quick military victory, however, failed to achieve tangible political gains. There was little, if any, coordination with the United States. As a result, under American pressure and Soviet threats to use military force, British, French and Israeli troops were forced to withdraw from Egypt. The lesson some Israelis learned from this episode was to not rely on foreign powers and to further accelerate the building of their own indigenous military capability. The Suez campaign proved to be the genesis of Israel's nuclear-weapons program.

In the mid-1950s, however, Israel lacked the necessary infrastructure to build its own nuclear weapons. Cooperation with foreign countries was crucial in the initiation and development of Israel's nuclear program. France played a prominent role, fulfilling Israel's technological needs in the early stage of building a nuclear infrastructure. The two nations shared commercial and strategic interests. First, both Paris and Tel Aviv saw an indigenous nuclear option as a way to maintain a degree of autonomy in foreign policy in the bipolar environment of the Cold War. The experience in the Suez campaign reinforced this proposition. Second, the French nuclear industry was young and growing. It needed to establish credentials and gain a reputation on the global scene. Before World War II, France had been a leading research center in

nuclear physics, but it had fallen far behind the United States, the Soviet Union and Britain.

Third, the two nations found a common enemy in President Nasser of Egypt. As mentioned above, Nasser, seeking to establish himself as the leader of Pan-Arabism, supported Palestinian attacks on Israel and Algerian resistance to the French occupation. This policy alienated both governments. Weakening Nasser became a shared goal for both Paris and Tel Aviv. This goal provided a basis for further cooperation. Israel provided valuable intelligence obtained from its contacts with Sephardic Jews in North Africa in return for the French military assistance that would strengthen the Jewish state. A militarily strong Israel that was capable of threatening Nasser would reduce his involvement in Algeria.

Given these common commercial and strategic interests, France provided crucial assistance to Israel's nuclear program. Israel had been an active participant in the French nuclear program from its inception, providing critical technical expertise, and the Israeli nuclear program can be seen as an extension of this earlier collaboration.¹¹ The French role was particularly important in the construction of a nuclear reactor at Dimona in the remote Negev desert.¹² Shortly after Britain, France and Israel withdrew their troops from Suez, French and Israeli officials reached an agreement on the construction of the nuclear reactor.¹³ Some sources suggest that the cooling circuits and waste facilities were built three times larger than necessary for a 24-megawatt reactor, an indication that it "had always been intended to make bomb quantities of plutonium."¹⁴ Furthermore, Francis Perrin, high commissioner of the

French atomic-energy agency from 1951 to 1970, revealed that, while Paris refused to directly provide Tel Aviv with a chemical-separation plant, "it did not interfere with an Israeli request for assistance from a French firm, Saint Gobain Techniques Nouvelles, which built reprocessing facilities for the French nuclear program."¹⁵ A new intelligence agency, the Office of Science Liaisons, was created to provide security and intelligence for the project.¹⁶

In 1960, the Dimona reactor faced significant hurdles. Shortly after taking office, President de Gaulle reconsidered France's close nuclear cooperation with Israel, demanding that Israel make the project public and submit to international inspection. France also demanded that Israel promise to use the reactor for civilian purposes, not weapons production. Despite French pressure, work proceeded, and by the mid-1960s the Dimona reactor went critical. The Israeli nuclear-weapons program became well-established and irreversible.

Besides close nuclear cooperation with France, Israel established ties with other countries, particularly South Africa. Considerable nuclear collaboration between Tel Aviv and Pretoria is reported to have developed in the late 1960s and continued through the following two decades. During this period, South Africa was Israel's primary supplier of uranium for Dimona.¹⁷ Immediately after the 1948 war, Israel launched a geological survey in the Negev desert hoping to discover uranium reserves. The results were mixed. Although no significant sources of uranium were found, recoverable amounts were discovered in phosphate deposits from which Israeli scientists have devised a method for extracting it. Furthermore,

Israel has obtained natural uranium supplies from a number of foreign sources.¹⁸ In addition to uranium, Israel needed heavy water and turned to Norway for this critical component. In the 1950s, Norway was considered a major exporter of heavy water.¹⁹ Oslo sold tons of it to Tel Aviv.

It is important to point out the Arab and Soviet reactions to these highly clandestine Israeli efforts to build a nuclear-weapons capability. It seems that most Arab countries in the 1950s and 1960s either knew nothing about the nascent Israeli nuclear program or chose to play down or ignore the little information that was available. Rhetoric aside, during these two crucial decades no Arab country mobilized economic and political assets to acquire nuclear weapons or to sabotage Israel's nuclear installations. Similarly, Soviet reaction was negligent in two senses. First, the Soviet Union was reluctant to condemn Israeli nuclear policy as a violation of the international nonproliferation regime. Second, the Soviet Union did not transfer nuclear military technology of any significance to the Arab states.²⁰

Although Israel acquired all the necessary materials and developed sophisticated technical expertise and infrastructure, there is no evidence that it has ever carried out a full-scale nuclear test. Some analysts believe that Israel has developed its nuclear-weapons capability by relying on computer simulations and test information from foreign sources. Other analysts contend that Israel carried out at least one nuclear test off the southern coast of Africa in September 1979. This putative test was detected by an American "Vela" satellite.

Similarly, there is a lack of consensus on the exact date when Israel crossed the

threshold and joined the nuclear club. It is widely believed it occurred around the end of the 1960s. According to the Center for Nonproliferation Studies at the Monterey Institute of International Studies, Israel had completed the research and development phase of its nuclear-weapons program by 1966 and "had passed the vulnerable transition period with little opportunity for an Arab reaction."²¹ The Federation of American Scientists reports that Israel "had two bombs in 1967, and that Prime Minister Eshkol ordered them armed in the nation's first nuclear alert²² during the Six-day War."²³ Avner Cohen asserts that "on the eve of the Six-day War Israel already had a rudimentary, but operational, nuclear weapon capability."²⁴ Seymour Hersh contends that, early in 1968, "Dimona finally was ordered into full-scale production and began turning out four or five warheads a year."²⁵ Finally, in July 1970, *The New York Times* reported that U.S. intelligence agencies considered Israel a nuclear-weapon state.²⁶

These speculations aside, it is clear that Israel's 1967 war against Egypt, Jordan and Syria had a significant impact on the Jewish state's strategic posture, including the nuclear program. At least three implications can be identified. First, the mobilization of Arab armies was seen as an existential threat to the Jewish state. Second, the Arab threat to attack Israel meant, among other things, that Israel's conventional deterrence had failed.²⁷ In other words, Tel Aviv's military superiority and victories in the 1948 and 1956 wars did not stop Arab strategists from considering and planning for a full-scale war against the Jewish state. Third, the massive territorial losses by Egypt, Jordan and Syria in the 1967 war had given Israel a reassur-

ing strategic depth and substantially improved its national security.

The next round of fighting between Israeli and Arab armies took place in the 1973 Yom Kippur War. On October 6, Egyptian troops launched an attack on Israeli positions, crossed the Suez Canal and breached Israel's strongly fortified Bar Lev line in the Sinai Peninsula. Simultaneously, Syrian troops attacked Israeli positions in the Golan Heights. This was the first time in the Arab-Israeli conflict that the Arabs had launched a large-scale surprise attack on Israeli positions. Initially, Israel was overwhelmed by these attacks, and Arab troops came close to posing an existential threat to the Jewish state. In response, Israeli leaders considered the possibility of using the nuclear option.²⁸ On the fourth day of the war, President Richard Nixon ordered Defense Secretary James Schlesinger "to carry out a massive airlift of American arms to Israel."²⁹ This was followed, a few weeks later, by an order putting all American conventional and nuclear forces on military alert. The Soviet Union took a similar course to protect Egypt and Syria.

The course of the Yom Kippur War suggests three implications for Israel's nuclear posture. First, as discussed above, Israel was believed to have developed nuclear weapons by 1973. Still, this nuclear capability did not deter the Egyptians and Syrians from attacking Israel. This, however, should not be seen as a complete failure. Cairo and Damascus launched a limited war. The goal was to liberate the territories they lost in the 1967 war, not to cross Israel's pre-1967 borders. Second, the massive and quick American military assistance can be explained partly by Washington's desire to prevent the conflict

from "going nuclear." Had the military situation worsened, the Israelis would have considered employing their weapons of "last resort." Third, the Soviet military alert demonstrated Israel's vulnerability to Soviet threats. In 1973, Israel was not in a position to militarily deter Soviet intervention.

Developments in the Persian Gulf in the 1980s provided Israel with a significant strategic advantage. In September 1980, the Iraqi army invaded Iran, hoping for a quick victory. The outcome was disastrous for both sides. With an estimated one million dead and injured, there is no doubt that it was a gross strategic miscalculation. After initial Iraqi success, the Iranians were able to regroup and stop the Iraqi advances. Furthermore, after liberating the territories they lost in the first few months of the war, the Iranians went on the offensive and insisted that they would not stop the war as long as Saddam Hussein remained in power. Concerned about the stability of the whole region, the Gulf monarchies and Western countries provided substantial financial and military assistance to Iraq. As a result, neither Tehran nor Baghdad was able to bring the war to a decisive end.

Israel's initial reaction to the Iran-Iraq War was driven by its perception of the two belligerent states. Baghdad has a legacy of enmity toward Tel Aviv. Meanwhile, since the inauguration of the revolutionary regime, Tehran has adopted an uncompromising stand against Israel. Despite the record of Iranian hostility, Israeli leaders recognized the value of the pre-revolution relationship with Iran. Thus, Israel's overall attitude at the beginning of the war was to support Iran and try to build and maintain good relations with the Iranian people in anticipation of a post-Khomeini era. Israeli support began to

wane in the mid-1980s in response to increasing signs that Iraq was softening its stand on the Arab-Israeli conflict. Iraqi fatigue from the war and Baghdad's desire to win Washington's support appeared to have generated "a more pragmatic Iraqi approach to the entire Arab-Israeli issue."³⁰ No longer did the Iraqi leaders present their country as the leading Arab state in the confrontation against Israel. Meanwhile, Iranian hostility toward Israel was intensified. Iranian propaganda repeatedly stated that the road to Jerusalem goes through Baghdad. In other words, in order to "liberate Palestine," Muslims must defeat the Iraqi regime in Baghdad. Furthermore, Iran created and supported Hizbollah in Lebanon, which was engaged in intense fighting against Israeli and Western interests in the region.

In mid-1988, Iran and Iraq agreed to end hostilities. The cease-fire initially was welcomed in Israel. Israeli leaders came to realize that the Iran-Iraq War had outlived its usefulness. Israel's initial reaction was soon replaced, however, by a more complex assessment of the implications of the end of hostilities. The real concern in Tel Aviv was whether Iran and Iraq would focus their resources on internal reconstruction or pursue foreign adventures, including renewing threats to Israel.

Four implications of the Iran-Iraq War on Israel's national security can be identified. First, the intense hostilities between two of Israel's archenemies substantially served Tel Aviv's security interests. The underlying Israeli reaction was great satisfaction at seeing Iran and Iraq exhausting each other's military and economic capabilities instead of employing them against the Jewish state. Second, during the course of the war, Israel be-

came deeply concerned about the conventional and non-conventional arms race. During the hostilities, Baghdad acquired and effectively used chemical weapons against both its own Kurdish population and against Iranian troops. In addition, Iraq acquired and employed ballistic missiles against civilian population centers in the so-called "war of the cities" with Iran. These missiles could reach targets in Israel, as happened during the 1991 Gulf War. From an Israeli point of view, "This was the first time ever that an Arab country that is not a frontline state had the capability of attacking Israel with a surface-to-surface missile without dispatching expeditionary units to one of the confrontation states."³¹

Third, the Iran-Iraq War meant that Israel did not need to worry about a military conflict with either the Arabs or the Iranians. This war, in conjunction with the peace treaty Israel signed with Egypt in 1979, gave Israel a great sense of security from attacks by foreign enemies. Fourth, Israeli leaders realized that the period of the Iran-Iraq War was unique and that with the end of hostilities a new and uncertain regional system was developing. Iraq emerged with massive conventional and non-conventional military capabilities but a collapsing economy. Saddam Hussein's invasion of Kuwait in August 1990 was largely driven by these two outcomes of the war with Iran. The invasion of Kuwait opened a new chapter in regional and international policy, and Israel had to respond.

On August 2, 1990, the Iraqi army invaded Kuwait and within a few hours was able to occupy the entire country. The invasion and the subsequent Gulf War represented a major turning point in Iraqi foreign policy, regional alliances and the

international system. On a few occasions, Arab armies have fought each other. However, the Iraqi takeover of Kuwait was the first time in modern history that one Arab country had completely absorbed another one. In response, traditional adversaries were persuaded to put their differences aside, at least temporarily, to face the Iraqi aggression. Syria, Egypt, Saudi Arabia and Israel were together in the international coalition against Iraq. Furthermore, instead of supporting the opposing sides in the conflict, the United States and the Soviet Union worked together to end the crisis.

The Iraqi occupation of Kuwait and the subsequent war were not related to the Arab-Israeli conflict. Tel Aviv had played no role in precipitating those events. Nevertheless, Israel found itself involved in the war in at least three ways. First, Saddam Hussein sought to link his occupation of Kuwait to the Israeli occupation of Palestinian territories. Second, in an attempt to get Israel involved in the fighting and break the international coalition, Iraq launched missile attacks on targets inside Israel. Third, the war changed the dynamics of the Arab-Israeli conflict and provided new incentives to pursue a comprehensive peace.

Just a few weeks after Iraq's attack on Kuwait, Saddam Hussein claimed that Iraq was not the only Middle Eastern country to have seized territory by force. Baghdad, he argued, would agree to review the Kuwaiti question if Israel declared itself ready to abandon the territories it had occupied in 1967.³² Iraq's assessment (or hope) was that this argument would make it hard for any Arab country to ignore this linkage. Israel naturally would refuse. The outrage over

the crisis would thus be deflected from Iraq to Israel. Pressure on Baghdad to evacuate Kuwait would be turned aside, and Kuwait would remain under Iraq's control. This attempt to link the Gulf crisis to the Arab-Israeli conflict did not work and, indeed, turned out to be another major strategic miscalculation.

During the Gulf War, 39 Iraqi Scud missiles armed with conventional warheads were launched against Israel. These were the first strikes of consequence at Israeli targets since the 1948 war. Iraq's intention was to undermine the international coalition; therefore, it sought to provoke Israel into military retaliation, hoping that this would make it politically impossible for the Arabs to remain in the coalition. Without their political backing, the war against Iraq would stop and attention would shift to the Arab-Israeli conflict. In addition, successful missile attacks on Israel would bolster Saddam Hussein's prestige in the Arab world and inflame popular sentiment. Israel, however, was determined not to be used as a tool to break the coalition.³³

Faced with Iraq's Scud missile attacks, Israel responded with a self-restraint that was at odds with its historical posture. Traditionally, Israeli deterrence was designed to compel neighboring Arab states to refrain from attacking its territory with large conventional forces. This was to be achieved by the promise that, if attacked, Israel would take the battle to the enemy's territory and destroy its attacking forces. Israel's decision not to respond to Iraq's surface-to-surface missile attacks was driven by four considerations.

- Israeli leaders understood that their military retaliation would complicate the task of maintaining the Arab states' participation in the anti-Iraq coalition.

Given the severe hostility that had characterized relations between Baghdad and Tel Aviv, Israel had a clear interest in seeing Iraq's military capabilities destroyed. Therefore, by not responding to the Iraqi missile attacks, the coalition remained intact and continued to pursue its objectives.

- The United States exerted tremendous pressure on Israel, demanding that Tel Aviv not play any role in the inter-Arab conflict. Israeli leaders knew that showing sensitivity to Washington's strategy and paying attention to its demands would further strengthen relations between the two countries. This policy paid off. According to Joseph Alpher, "During the Gulf crisis the United States shipped two batteries of modified Patriot anti-aircraft missiles, together with their American crews, so as to provide Israel with some antimissile protection."³⁴ This was the first time in Israel's history that American combat units were sent to take an active part in its defense. The fact that some of the Iraqi missiles reached Israel demonstrates that the Patriots were not very effective.

- Israel's ability to retaliate against Iraq's missile attacks was constrained by the international coalition's refusal to coordinate its military operations with Israel. Without such coordination Israeli forces could not have been involved in an area that formed part of the coalition's theater of operations. In the end, there was nothing useful that Israeli forces could have done to augment the massive American bombing of Iraq.

- Fourth, writes Shai Feldman, Israel's restraint was also made easier by the fact that "the damage caused by Iraq's missile attacks during the war remained limited. Although considerable structural damage

was incurred, the number of casualties caused by these attacks was minuscule."³⁵

These Iraqi Scud missile attacks on Israel have had significant military and strategic ramifications. First, the attacks demonstrated that hostile states that do not share borders with Israel still can inflict harm on the Jewish state. These missiles, potentially coupled with chemical, biological and nuclear capabilities, have substantially altered the security environment in the whole Middle East. Non-conventional capabilities and the methods to deliver them have become an option in warfare in the region. Second, despite these attacks, it is important to point out that Saddam Hussein refrained from using chemical warheads, which he had used in the war against Iran (1980-88). This demonstrates that Israel's deterrence policy was not a complete failure. Certainly Tel Aviv's unspecified threat of massive retaliation deterred Saddam from using his chemical weapons. The Iraqi leader's decision to refrain from attacking Israel with chemical weapons was driven by his fear of possible Israeli nuclear reprisal.

Finally, the war provided significant momentum for a comprehensive peace between Israel and its Arab neighbors. The main reason behind this momentum was American determination to reassure the Arab partners in the anti-Iraq coalition that the United States had formulated a plan for peace. Several months after the end of hostilities, Washington succeeded in convening an international conference in Madrid to negotiate a peaceful settlement to the Arab-Israeli conflict. The major regional and international powers were represented, and several joint committees were created to address various aspects of the conflict (e.g., water and arms control).

This opportunity, like many others, however, was missed. The military and political outcomes of the Gulf War did not create the “right” environment to negotiate peace. First, the Arab world was severely divided and polarized by the war. Major Arab states such as Egypt, Syria and Saudi Arabia supported the United States and sent military units to fight side by side with the American, British and French troops against the Iraqi army. But a few Arab states such as Jordan and Yemen supported Iraq. Second, Palestinians in the West Bank and Gaza Strip generally were in favor of the Iraqi takeover of Kuwait. Moreover, despite some ambiguity and conflicting statements, the PLO voted against the Arab League resolution opposing Iraq’s action, and Yasser Arafat supported Saddam Hussein.

Third, at the end of the war, the United States turned down Tel Aviv’s request for U.S. guarantees of housing loans to facilitate the integration of Jewish immigrants from the Soviet Union. One reason for this almost unprecedented American pressure on Israel was Washington’s attempt to present itself as an honest broker in the Arab-Israeli conflict. The 1992 Israeli elections resulted in an improvement of U.S.-Israeli relations on this matter, as the policy of the newly elected Labor government on settlements in the West Bank met the preferences of the Bush administration in connection with the loan guarantees. In short, despite a little tension between the Bush administration and the Likud-led Israeli government, the war confirmed American strategic and security commitments to Israel. All these developments together left the major parties in the Arab-Israeli conflict with few incentives to reach a breakthrough in the

peace process. The outcome of the Madrid conference was slow and modest progress toward a comprehensive peace. The breakthrough came a few months later when the Palestinians and Israelis directly negotiated and signed the Oslo agreement. Two conclusions can be drawn from the experience of the Gulf War and its aftermath. First, the Gulf War, like the 1980-88 Iran-Iraq War, shattered the concept of Arab unity and neutralized the Arabs’ capacity to form an effective eastern front against Israel. As a result, the likelihood of a war between Israel and its Arab neighbors was substantially reduced. Second, for Israel, the Gulf War was an almost unqualified blessing. “It ensured that Israel would not have to handle Saddam alone and that the United States would maintain a hegemonic presence in the Middle East as long as the Iraqi threat persisted.”³⁶ In short, the Gulf War drastically altered the regional military balance to Israel’s advantage.

This conclusion applies also to the next round of fighting in the Persian Gulf, the 2003 war in Iraq. In March of that year, the United States led an international coalition that toppled Saddam Hussein and later arrested him. This is the first time in modern history that the leader of a major Arab state had been overthrown by a foreign power. Israel did not play any role in the war and, unlike during the 1991 Gulf War, Saddam Hussein did not launch missile attacks on Israeli targets. Still, the fallout from the war and its impact on regional stability have had strong implications for Israel’s national security.

First, Saddam Hussein adopted a militant stand toward Israel, opposed the peace process and supported Palestinian suicide attacks. His removal from power is seen as a positive development in Tel Aviv.

However, the uncertainty regarding the future of post-Saddam Iraq suggests that caution should be applied. In the near future, any government in Baghdad is likely to be preoccupied with rebuilding the country; establishing relations with the Jewish state is not likely to be at the top of the agenda. In short, a post-Saddam Iraq may not remain an enemy of Israel, but it also is not likely to become a friend.

Second, Iraq's armed forces suffered heavy losses in the 2003 war. Shortly after the collapse of Saddam Hussein's regime, the United States disbanded the remains of the army and began building a new one, trained and equipped under American supervision. Iraq's intelligence and security organizations went through a similar process. The war also removed the threat of Baghdad's potential employment of weapons of mass destruction (WMD). All these developments have enhanced Israel's strategic posture in the Middle East.

Third, since the late 1960s, many Arabs have come to the conclusion that Israel was there to stay and gradually have decided to accommodate, recognize and even establish diplomatic and commercial relations with the Jewish state — Egypt, Jordan, Oman and Qatar, among others. Saudi leaders proposed peace plans under which Riyadh would normalize relations with Tel Aviv, albeit under certain conditions. Saddam Hussein was one of a few Arab leaders who showed no sign of recognizing Israel or accepting a peaceful solution to the Arab-

Israeli conflict. His departure from the scene is likely to enhance the chances for peaceful negotiations. Indeed, one month after the toppling of the Hussein regime, the United States, the United Nations, the European Union and Russia initiated a new peace plan, the Roadmap, to end the conflict.

Fourth, the ability of the Arab states to form an eastern front (Iraq, Syria and Jordan as well as the Palestinians) against Israel has considerably diminished. This front has always been considered by the Israeli strategic planners as more dangerous than the northern and southern fronts because it is closer to the center (the Jerusalem-Tel Aviv-Haifa triangle).

Finally, Iraq was "a major catalyst for an accelerated arms race at both the

conventional and non-conventional levels."³⁷ After the war, Israeli Prime Minister Ariel Sharon turned his attention to other countries and demanded that Iran, Libya and Syria also be

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stripped of WMD. However, “the active involvement of Israeli intelligence in exaggerating the threat of the Iraqi WMD program has been a blow to Israel’s credibility.”³⁸ Shortly after the war, Israeli intellectuals raised concern over the role the Israeli intelligence agencies played in projecting an assessment of the Iraqi threat. Shlomo Brom contends that Israeli intelligence was a full partner to the picture presented by American and British intelligence regarding Iraq’s non-conventional capabilities. “In addition to an exaggerated

assessment of Iraqi capabilities, it was assessed that the Iraqis were apt to use these capabilities against Israel. In actuality, Israel was not attacked, either because Iraq did not have the capability or because it had no intention of doing so.³⁹ Ephraim Kam calls for “an in-depth examination to explore whether the intelligence community used the information at its disposal in a competent and balanced manner.”⁴⁰

Second Strike Capability

One of the most important strategic developments in the Israeli nuclear posture is its acquisition of a sea-based nuclear capability. The roots of this strategic development lie in the 1980-88 Iran-Iraq War. During this conflict, both Tehran and Baghdad, as well as other Arab countries, acquired and enhanced their missile capabilities. In other words, since the 1980s, several of Israel’s adversaries have acquired the capability to hit targets within the Jewish state. Given Israel’s relative lack of strategic depth and the concentration of its population in few centers, these Arabs and Iranians missile capabilities have heightened the Jewish state’s vulnerability.

Accordingly, Israeli strategists and top military leaders have considered adding a number of Dolphin-class submarines to their naval arsenal. Decisions to buy them, however, were deferred due to operational and financial considerations.⁴¹ Iraqi missile attacks on Israel during the 1991 Gulf War and Iran’s aggressive efforts to expand and improve its missile capabilities have convinced the Israelis to pursue the submarine option. In the mid-1990s, Israel ordered three specially designed submarines from Germany; they were delivered in 1999 and 2000.⁴² Germany agreed to

sell Israel two additional submarines in 2004.⁴³ The specific capabilities of these diesel-powered vessels remain highly classified. They are believed to have a range of several hundred miles and can remain at sea for up to a month.⁴⁴ They are “capable of launching torpedoes, mines and cruise missiles.”⁴⁵ Israeli scientists have modified American-supplied Harpoon cruise missiles to carry nuclear warheads on submarines. It was reported that Israel carried out tests of these missile systems in the Indian Ocean in May 2000.⁴⁶

Nuclear Opacity

Unlike the other nuclear powers, Israel has maintained a certain level of ambiguity regarding its nuclear status. Israeli officials have never confirmed or denied having nuclear weapons. Some analysts call this deliberate concealment “deterrence through uncertainty.”⁴⁷ Shimon Peres once highlighted Israel’s motive for nuclear opacity: “A certain amount of secrecy must be maintained in some fields. The suspicion and fog surrounding this question (nuclear weapons) are constructive, because they strengthen our deterrent.”⁴⁸

Avner Cohen defines opacity as a “situation in which the existence of a state’s nuclear weapons has not been acknowledged by the state’s leaders, but in which the evidence for the weapons’ existence is strong enough to influence other nations’ perceptions and actions.”⁴⁹ In other words, this notion has two components: secrecy and leaks or signaling to enemies and adversaries. Thus, when asked about the precise state of their nuclear-weapons capacity, Israeli officials have always repeated what former Prime Minister Levi Eshkol said in the mid-1960s: Israel will not be the first nation to intro-

duce nuclear weapons into the Middle East.

Israel's nuclear program has rarely been discussed in public. One of the few public statements was made by David Ben-Gurion in December 1960, when he informed the Knesset that the nuclear reactor in Dimona was designed for research and peaceful purposes. Another public discussion of the nation's nuclear program occurred in February 2000, when members in the Knesset briefly debated the issue.⁵⁰ The only detailed public account of Israel's nuclear program came in 1986, when Mordecai Vanunu, an Israeli arms technician who had worked at the Dimona reactor, provided photographs and information to the London Sunday *Times*. He was lured out of hiding in London by a female Israeli secret agent who persuaded him that she wanted to meet him in Rome. Once there, he was drugged by other Israeli agents and brought home. Later that year, Vanunu was jailed for 18 years following a trial for treason that was held in secret. He spent most of his sentence in solitary confinement. Upon his release in 2004, several restrictions were imposed on his travel and contact with foreigners.

Most Israelis consider this policy of nuclear opacity as a great strategic success. By not admitting to having nuclear weapons, Israel has avoided being in violation of the global nonproliferation regime. At the same time, Israel was able to keep its enemies guessing about its military capabilities, denying them an incentive to pursue a nuclear option. Meanwhile, by not denying it had a nuclear-weapons capability, Tel Aviv has been able to deter its enemies from posing an existential threat. In short, nuclear opacity has given Israel the military and

strategic benefits without having to pay a political cost.

Some analysts argue, however, that nuclear opacity has outlived its usefulness and that the time has come for the Israeli government to "come out of the closet" and declare itself a nuclear power. This argument has two bases: First, in a democracy like Israel, the public has the right to know and debate a crucial component of the nation's national security. Zeev Maoz writes, "Israel's nuclear policy must be the result of open discussion, not a bureaucratic fait accompli made in secrecy with little or no governmental, parliamentary or public oversight."⁵¹ Second, an effective deterrent requires certainty, not ambiguity.⁵² Israel's enemies would never consider launching an attack on Israel because they are certain of the nation's nuclear-weapons capability. Avner Cohen and Thomas Graham contend that, in the final analysis, both in domestic and foreign policy, the notion of nuclear opacity has become a "negative factor for Israeli democracy, security and the worldwide nonproliferation regime."⁵³

MISSILE CAPABILITIES

Israel's missile and nuclear efforts have always been linked. Israel is not only the only nuclear power in the Middle East; it also has one of the most advanced ballistic-missile programs in the region. Since the state was created in the late 1940s, Israel has invested substantial resources in research, development, testing and deployment of a variety of missile systems. According to Gerald Steinberg, the Israeli government created a Science Corps in the military in 1948 that was active in developing the technological base for the components necessary for missile

production. The Science Corps “evolved into the National Weapons Development Authority (Rafael), which developed and launched sounding rockets.”⁵⁴

As in building nuclear capability, Israel initially needed foreign assistance and later developed its own infrastructure and indigenous capability. Since the mid-1970s, the United States has openly supplied Lance missiles and missile-production technology to Israel.⁵⁵ A decade earlier, in the mid-1960s, Israel ordered a number of the surface-to-surface Jericho-1 missiles from the French firm Marcel Dassault and shortly thereafter began to develop them on its own. The missile was reported to fly 500 kilometers (310 miles) carrying a payload big enough for a nuclear war-head.⁵⁶ Israel began its more ambitious Jericho-II program in the 1970s. These two-stage solid-fuel missiles “can deliver a 1,000 kilogram (2200 pounds) payload far enough to reach Tripoli, Baghdad, Tehran, and even points in Russia.”⁵⁷ There have been reports of an upgraded Jericho-III with a range of over 3,000 km (1860 miles).⁵⁸

It is important to point out that the development and deployment of Israeli missiles is part of the broad and intense arms race in the Middle East. Iran and several Arab states have also acquired short- and medium-range missiles. Within this context, one can examine Israel’s space program and missile defense systems. In the early decades of the Cold War, the United States and the Soviet Union enjoyed greater ability than other countries to operate reconnaissance satellites with different degrees of precision. Israel and some Arab countries relied on Washington and Moscow, respectively, to provide them with crucial intelligence

information on their enemies. Given its technological capabilities, Israel has been able to launch its own satellite, Ofeq, since 1988. This development means that Israel has become the only state in the Middle East and one of only a handful of countries in the world with the capability to put objects into orbit.⁵⁹ Thus, Israel is considered a mini-superpower when it comes to satellites.

Israel has invested substantial human and financial resources in the space industry since the early 1980s. Israel Space Agency was created in 1983. A major goal has been to acquire an independent orbital capability (e.g., reconnaissance satellites) to monitor activities in Iraq and neighboring Arab countries.⁶⁰ Israel launched Ofeq-1 in 1988; in 1990, it was replaced by Ofeq-2. These were research satellites. The first intelligence satellite was Ofeq-3, launched in 1995 with the reported capability to “produce photographs of approximately one meter resolution.”⁶¹

An attempt to launch Ofeq-4 failed in 1998, but Ofeq-5 was successfully launched in 2002. Again, in 2004, the defense establishment failed to launch Ofeq-6. These repeated failures have not weakened the Israeli government’s determination to continue its space program. An important characteristic of these satellites is that they had been launched westward, against the earth’s rotation in order to eliminate the possibility that debris from the rocket or the satellites themselves would fall over Israel’s Arab neighbors. This strategy requires Israel to use stronger rockets than the ones fired into the earth’s orbit.

The proliferation of surface-to-surface missiles in the Middle East, particularly during the Iran-Iraq War, and the potential

use of these missiles against Israel were noted in the mid-1980s. In response, the United States and Israel signed a memorandum of understanding on the joint development of the Arrow anti-tactical ballistic missile (ATBM) system in 1986. The Patriot missile defense batteries, built by the United States as an anti-aircraft system and modified to guard against incoming missiles, had only a partial success against the Iraqi Scud missiles in the 1991 Gulf War. This failure to intercept all Scud missiles has further underlined the need for a more accurate missile-defense system and gave a momentum to the American-Israeli cooperation to build Arrow.

Arrow is one of the most advanced missile-defense systems in the world. It is a two-stage, solid-fuel missile consisting of high-altitude interceptors able to seek and destroy incoming ballistic missiles in their terminal phase. "Arrow consists of three main components: A phased-array radar, a fire-control center, and a high-altitude interceptor missile. The phased-array radar, known as 'Green Pine,' is capable of detecting incoming warheads. Then, the fire-control center, called 'Citron Tree,' launches its interceptor missile."⁶² The estimated cost of the Arrow is more than \$2 billion, most of it paid by the United States. The system has made significant strides since its first test flight in July 1995. It was delivered to the Air Force and declared operational in 2000.⁶³

In closing, three important points need to be highlighted. First, by deploying the Arrow, Israel has become the first and only nation in the world to have a national defense shield. Second, Arrow critics believe that the huge investment is a waste because the attacking missile "will always

be cheaper, more effective and crafty than the defending missile."⁶⁴ They argue that Israel would be better protected by continuing to rely on its deterrent power. Third, Arrow should be seen as Israel's last line of defense, not the primary one.⁶⁵ The nation would be better protected by engaging in a successful peace process that would reduce incentives to attack it.

IMPLICATIONS FOR U.S. POLICY

From its inception in the late 1950s, Israel's nuclear program has posed a great challenge to U.S. foreign policy in the Middle East and the Islamic world and to its overall nonproliferation strategy. A major dilemma has been how to accommodate Israel's security needs and its undeclared nuclear-weapons capability while pressuring Iran and the Arab states not to acquire such a capability. Accordingly, Arab and some Muslim countries have always accused the United States of adopting a double standard in its nonproliferation policy.

In a speech before the United Nations in December 1953, President Eisenhower announced his Atoms for Peace program. A fundamental characteristic of this new policy was the distinction between military applications and civilian uses of nuclear power. Providing nuclear technology to American allies — under international safeguards — would enable them to enjoy the benefits of this technology without turning it into weapons. Thus, Atoms for Peace made it easier to U.S. allies to have access to nuclear materials and technology. Israel was the second nation, after Turkey, to join the program and in 1955 signed an agreement with the United States for peaceful nuclear cooperation.⁶⁶

The United States first became aware

of Israel's activities at the Dimona reactor after U-2 overflights in 1958 captured the facility's construction, but it was not identified as a nuclear reactor until 1960.⁶⁷ President Kennedy opposed the clandestine Israeli nuclear program and demanded that U.S. scientists be allowed to inspect Dimona to verify Israel's claims that it was for peaceful purposes. After a long delay and strong hesitation, Israel allowed such a visit. The issue of Israel's nuclear program was further escalated when President Kennedy threatened that bilateral relations between Washington and Tel Aviv would be jeopardized if the Israeli government did not comply with his demand.

This pressure by the Kennedy administration had largely come to a halt when the president was assassinated. Two developments contributed to this outcome. Israel had already crossed the nuclear threshold, and any attempt to prevent it from acquiring nuclear-weapons capability became counterproductive. In addition, President Johnson was less determined than his predecessor to pressure Israel to open its nuclear installation to inspection and prevent it from acquiring nuclear weapons. One of the last opportunities to compel Israel to comply with the international nonproliferation regime came after the 1967 war, when the United States increasingly replaced France as Tel Aviv's main arms supplier. According to Michael Engelhardt, "Several U.S. officials pushed to condition further arms sales, especially sales of nuclear-capable F-4 Phantom jets, on Israel's signing the NPT (Nuclear Non-Proliferation Treaty). President Johnson refused to link arms supplies to the NPT."⁶⁸ Israel received the Phantom jets without signing the treaty.

The reluctant U.S. pressure on Israel

and the half-hearted demand that it sign the NPT came to an end in 1969, when Israeli Prime Minister Golda Meir reached an agreement with President Nixon: Israel would not test nuclear weapons and would not publicly admit having them, and in return the United States would recognize that the "Israeli nuclear bomb was a fait accompli"⁶⁹ and would stop pressuring Israel to sign the NPT. Since then, subsequent administrations, regardless of their commitments to nonproliferation, felt there was very little, if anything, they could do. In addition to the fact that most administrations have refrained from exerting pressure on Israel to give up its nuclear-weapons capability, the Congress has rejected taking any measure that would compel the Jewish state to join the international nonproliferation regime. In 1979, for instance, the Senate rejected, by a vote of 76 to 6, an amendment "that would have conditioned the special aid package that Israel received after the conclusion of the peace treaty with Egypt on Israel's signing the NPT."⁷⁰

The initial U.S. opposition to Israel's nuclear-weapons program in the early 1960s was based on two considerations. First, Israel's nuclear ambition might have ignited a nuclear arms race in the Middle East; and second, the Soviet Union might have provided Arab states with nuclear protection. This might have led to a response by the United States and a potential nuclear confrontation between the two superpowers in the Middle East. These two possibilities failed to materialize.

This U.S. willingness to appreciate Israel's security needs and accommodate its nuclear-weapons program while strongly rejecting a similar move by the Arabs or Iranians seems to have stemmed from at least two considerations. First,

some of Israel's neighbors have refused to recognize its existence and that the Jewish state has become an integral part of the Middle East landscape. Despite its conventional-weapons, the argument goes, Israel needs a deterrent of last resort to face a potential existential threat. Second, as Shai Feldman argues, U.S. policy "emphasizes that the nature of a country's regime is a key determinant of whether it is a proliferation concern."⁷¹ Unlike most Arab countries and Iran, American officials have always considered Israel a pluralist democracy that has demonstrated "nuclear restraint." Stated differently, the United States would be more concerned about nuclear weapons at the hands of dictators than under the control of democratic regimes.

CONCLUSION: THE WAY AHEAD

The proliferation of nuclear weapons in the Middle East has been a major threat to regional peace and global stability for several decades. The controversy over alleged Iraqi nuclear weapons and the unsettled question of Iran's nuclear-weapons ambitions have further intensified the debate over the nuclear arms race in the region. Iran and the Arab states have constantly demanded that Israel give up its nuclear weapons and sign the NPT.

The Israeli stand on nuclear disarmament has been constant for a long time. Israel's formal policy, the so-called long corridor, as Shimon Peres once stated, allows "no possibility of discussing the issue of dismantling the weapons before peace is reached between all the states in the region, including Iran."⁷² Israeli leaders contend that nuclear weapons constitute the ultimate insurance policy against an existential threat. As long as there are

hostile neighbors who question the Jewish state's mere existence, they argue, Israel will not consider relinquishing the nuclear option. Finally, many Israeli officials and analysts believe that the nation's nuclear weapons have been a major factor convincing the Arabs to rule out war as an option for settling the conflict and to choose to make peace with the Jewish state. Thus, nuclear weapons serve as a stabilizing factor in the Middle East.

This argument for maintaining nuclear capability is repudiated by some scholars on several grounds. First, some Arabs have been willing to recognize the Jewish state and have negotiated peace agreements with it since the early 1950s, before Israel made the bomb. In other words, Israeli superiority in conventional weapons, not nuclear capability, has brought Arabs to the negotiating table.⁷³ Second, Israeli national security has steadily and substantially improved since the early 1980s. The Iran-Iraq War, the Gulf War, and the 2003 war in Iraq have all contributed to the polarization of Arab policy, the collapse of the eastern front, and the depletion of Arab and Iranian resources. The gap in military capability between Israel and its adversaries has expanded. As a result, Israel probably has never been more secure from external enemies in its history. This asymmetry of power suggests that a war between some or all Arab states and Israel "has become a practical and rational improbability."⁷⁴ Third, Israel is more threatened by terrorist attacks and the increasing proliferation of WMD in the Middle East. Ironically, the argument goes, Israeli nuclear weapons provide incentives to the Arabs and Iranians to acquire a nuclear capability or at least chemical and biological weapons.

The debate over Israel's nuclear weapons is not likely to end any time soon. For the foreseeable future, Tel Aviv is certain to maintain its nuclear weapons,

and Iran and some Arab countries are likely to keep stockpiling WMD to match the Israelis and to maintain a degree of "balance of terror."

¹ Ross Dunn, "Israel Ranked Sixth Nuclear Power by the United States," *The Times*, October 9, 1999.

² *Maariv International*, "Israel to Retain Ambiguous Nuclear Policy," July 7, 2004.

³ Federation of American Scientists, *Nuclear Weapons*, available online at <<http://fas.org/nuke/guide/israel/nuke>>, accessed December 10, 2005.

⁴ Shlomo Aronson, *The Politics and Strategy of Nuclear Weapons in the Middle East* (State University of New York Press, 1992), p. 44.

⁵ Robert G. Neumann, "Conventional Arms Exports and Stability in the Middle East," *Journal of International Affairs*, Vol. 49, No. 1, Summer 1995, pp.183-202.

⁶ Louis René Beres, *Israel's Strategic Future: The Final Report of Project Daniel*, April 2004. Available online at <<http://www.acpr.org.il/English-Nativ/03-issue/daniel-3.htm>>, accessed October 6, 2004.

⁷ For more details see Avner Cohen, "Israel and Chemical/Biological Weapons: History, Deterrence, and Arms Control," *Nonproliferation Review*, Vol. 8, No. 3, Fall-Winter 2001, pp. 27-53.

⁸ There are some reports that in 1948, Israeli agents were involved in covert operations to poison water supplies in some Palestinian villages.

⁹ For a detailed analysis of the early opposition to nuclear weapons see Uri Bar-Joseph, "The Hidden Debate: The Formation of Nuclear Doctrines in the Middle East," *Journal of Strategic Studies*, Vol. 5, No. 2, June 1982, pp. 205-227.

¹⁰ Shlomo Aronson, *The Politics and Strategy of Nuclear Weapons in the Middle East: Opacity, Theory, and Reality, 1960-1991 – An Israeli Perspective* (State University of New York Press, 1992), p. 65.

¹¹ John Steinbach, *Israeli Weapons of Mass Destruction: A Threat to Peace*, Center for Research on Globalization, March 2, 2002, available online at <<http://www.globalresearch.ca/articles/STE203Ap.html>> accessed November 26, 2005.

¹² The French journalist Pierre Pean described in detail the Franco-Israeli nuclear cooperation in his book, *Les Deux Bombes* (Paris: Fayard, 1982).

¹³ Yair Evron, "Israel and Nuclear Weapons," pp. 123-141. Jae Kyu Park, (ed), *Nuclear Proliferation in Developing Countries* (Seoul: The Institute for Far Eastern Studies, 1979), p. 124.

¹⁴ Wisconsin Project on Nuclear Arms Control, "Israel's Nuclear Weapon Capability: An Overview," *The Risk Report*, Vol. 2, No. 4, July-August 1996, online at <<http://www.wisconsinproject.org/countries/israel/nuke.html>> accessed November 27, 2005.

¹⁵ Mitchell Reiss, *Without the Bomb: The Politics of Nuclear Nonproliferation* (Columbia University Press, 1988), p. 149.

¹⁶ Federation of American Scientists, *Nuclear Weapons*, available online at <<http://fas.org/nuke/guide/israel/nuke>> accessed November 26, 2005.

¹⁷ Nuclear Weapon Archive, *Israel's Nuclear Weapons Program*, December 10, 1997, online at <<http://nuclearweaponarchive.org/Israel/Isrhist.html>> accessed November 26, 2005.

¹⁸ In the 1960s, over 200 pounds of highly enriched uranium were considered missing from the Nuclear Materials and Equipment Corporation of Apollo, Pennsylvania. Many reports suggested that these weapons-grade materials had ended up in Israel. However, no conclusive evidence has been found. For more details, see David Burnham, "The Case of the Missing Uranium," *Atlantic Monthly*, Vol. 243, No. 4, April 1979, pp. 78-82.

¹⁹ Before World War II, Norway invented an electrolysis method for producing large quantities of heavy water.

²⁰ Yair Evron, *Israel's Nuclear Dilemma* (Cornell University Press, 1994), p. 153.

²¹ Center for Nonproliferation Studies, Monterey Institute of International Studies, *Israel: Nuclear Overview*, available online at <http://www.nti.org/e_research/profiles/Israel/Nuclear/print/index_3578.prt> accessed

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²² The other two reported alerts were in the 1973 War and the 1991 Gulf War.

²³ Federation of American Scientists, *Nuclear Weapons*, available on line at <<http://fas.org/nuke/guide/israel/nuke>> accessed November 26, 2005.

²⁴ Avner Cohen, *Israel and the Bomb* (Columbia University Press, 1998), p. 1.

²⁵ Seymour M. Hersh, *The Samson Option: Israel's Nuclear Arsenal and American Foreign Policy* (Random House, 1991), p. 179.

²⁶ Hedrick Smith, "U.S. Assumes the Israelis Have A-Bomb or Its Parts," *The New York Times*, July 18, 1970.

²⁷ Avner Cohen and Marvin Miller, "Nuclear Shadows in the Middle East: Prospects for Arms Control in the Wake of the Gulf Crisis," *Security Studies*, Vol. 1, No. 1, fall 1991, pp. 54-77.

²⁸ Moshe Dayan, then defense minister, proposed to prepare for a potential use of nuclear weapons. However, Golda Meir, then prime minister, decided that the military situation had not reached the stage of "last resort" and rejected Dayan's proposal.

²⁹ George Lenczowski, *American Presidents and the Middle East* (Duke University Press, 1990), p. 129.

³⁰ Joseph Alpher, "Israel and the Iran-Iraq War," pp. 154-168 in Efraim Karsh (ed), *The Iran-Iraq War: Impact and Implications* (St Martin's Press, 1989), p. 163.

³¹ Bernard Reich, "Israel and the Iran-Iraq War," pp. 75-90 in Christopher C. Joyner (ed), *The Persian Gulf War: Lessons for Strategy, Law, and Diplomacy* (Greenwood Press, 1990), p. 82.

³² Saddam Hussein also mentioned that Syria should agree to withdraw its troops from Lebanon.

³³ A few days after Saddam Hussein was arrested in December 2003, the Israeli media revealed that the Israeli government had developed a plan in 1992 to assassinate Saddam Hussein to punish him for his missile attacks. The operation, however, was called off after a training accident.

³⁴ Joseph Alpher, *War in the Gulf: Implications for Israel* (Westview Press, 1992), p. 41.

³⁵ Shai Feldman, "Israeli Deterrence and the Gulf War," pp. 184-208, in Joseph Alpher (ed), *War in the Gulf: Implications for Israel* (Westview Press, 1992).

³⁶ Avner Yaniv, "Israel Faces Iraq: The Politics of Confrontation," pp. 233-251, in Amatzia Baram and Barry Rubin, (eds) *Iraq's Road to War* (St. Martin's Press, 1993).

³⁷ Shai Feldman, *After the War in Iraq: Defining the New Strategic Balance* (Sussex Academic Press, 2003), p.107.

³⁸ Rosemary Hollis, *Iraq in Transition: Vortex or Catalyst?* Briefing Paper, London: Chatham House, September 2004, p.21.

³⁹ Shlomo Brom, "The War in Iraq: An Intelligence Failure?" *Strategic Assessment*, Vol. 6, No. 3, November 2003, online at <<http://www.tau.ac.il/jcss/sa/v6n3p3Bro.html>> accessed December 5, 2003.

⁴⁰ Ephraim Kam, "Israeli Intelligence on Iraq: Sound Professional Assessment," *Strategic Assessment*, Vol. 6, No. 3, November 2003, online at <<http://www.tau.ac.il/jcss/sa/v6n3p5Kam.html>> accessed December 5, 2003.

⁴¹ Avner Cohen, "The Last Taboo: Israel's Bomb Revisited," *Current History*, Vol. 104, No. 681, April 2005, pp. 169-175.

⁴² Douglas Frantz, "Israel's Arsenal Is Point of Contention," *The Los Angeles Times*, October 12, 2003.

⁴³ *Maariv International*, "Israel to Acquire Two More German Submarines," December 23, 2004.

⁴⁴ Amir Mizroch, "Report: Israel Adds Nukes to Its Submarines," *Jerusalem Post*, October 11, 2003.

⁴⁵ Joseph Cirincione, Jon B. Wolfsthal, and Miriam Rajkumar, *Deadly Arsenal: Nuclear, Biological, and Chemical Threats* (Carnegie Endowment for International Peace, 2005), p. 263.

⁴⁶ Peter Beaumont and Conal Urquhart, "Israel Deploys Nuclear Arms in Submarines," *Guardian*, October 12, 2003.

⁴⁷ Shai Feldman, *Nuclear Weapons and Arms Control in the Middle East* (MIT Press, 1994), p. 97.

⁴⁸ *British Broadcasting Corporation*, Israel's Nuclear Program, on line at <http://newsvote.bbc.co.uk/mpapps/pagetools/print/news.bbc.co.uk/1/hi/world/middle_east/3340639.stm> accessed December 23, 2003.

⁴⁹ Avner Cohen, *Israel and the Bomb*, (Columbia University Press), 1998, p. IX.

⁵⁰ Deborah Sontag, "Israeli Lawmakers Hold Quick Debate on Nuclear Arms," *The New York Times*, February 3, 2000.

⁵¹ Zeev Maoz, "The Mixed Blessing of Israel's Nuclear Policy," *International Security*, Vol. 28, No. 2, Fall

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⁵² Avner Cohen, "Israel and Chemical and Biological Weapons: History, Deterrence, and Arms Control," *Nonproliferation Review*, Vol. 8, No. 3, Fall-Winter 2001, pp. 27-53.

⁵³ Avner Cohen and Thomas Graham Jr., "WMD in the Middle East: A Diminishing Currency," *Disarmament Diplomacy*, No. 76 March/April 2004, pp. 22-26.

⁵⁴ Gerald M. Steinberg, "Israel: Case Study for International Missile Trade and Nonproliferation," pp.235-253, in William C. Potter and Harlan W. Jencks (eds), *The International Missile Bazaar: The New Suppliers' Network* (Westview Press, 1994).

⁵⁵ *The Risk Report*, "Israel: United States Is Its Leading Foreign Missile-tech Supplier," Vol. 1, No. 5, June 1995, online at <<http://www.wisconsinproject.org/countries/israel/unitedstatesleading.htm>> accessed November 27, 2005.

⁵⁶ *Ibid*, "Israel: How Far Can Its Missile Fly?"

⁵⁷ *The Risk Report*, "Israel Missile Update, 2000," Vol. 6, No. 6, November-December 2000, online at <<http://www.wisconsinproject.org/countries/israel/missile2000.htm>> accessed November 27, 2005.

⁵⁸ Center for Nonproliferation Studies at Monterey Institute of International Studies, "Israel: Missile Overview," online at <http://www.nti.org/e_research/profiles/Israel/Missile/print/index_3563.prt> accessed November 27, 2005.

⁵⁹ Iran and a number of Arab countries operate satellites in space but they depend on foreign countries to launch them.

⁶⁰ Arieh O'Sullivan, "Launch of Ofeq 6 Fails," *Jerusalem Post*, September 6, 2004.

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⁶³ Arieh O'Sullivan, "Arrow-2 Missile Test A Success," *Jerusalem Post*, July 31, 2004.

⁶⁴ *Haaretz*, "The Arrow Is Israel's Insurance Policy," September 17, 2000.

⁶⁵ Efraim Karsh, "Israel's Imperative," *Washington Quarterly*, Vol. 23, No. 3, Summer 2000, pp.155-161.

⁶⁶ Avner Cohen, *Israel and the Bomb* (Columbia University Press, 1998), p.44.

⁶⁷ Federation of American Scientists, *Nuclear Weapons*, online at <<http://fas.org/nuke/guide/israel/nuke>> accessed November 26, 2005.

⁶⁸ Michael J. Engelhardt, "A Nonproliferation Failure: America and Israel's Nuclear Program, 1960-1968," *Nonproliferation Review*, Vol. 11, No. 3, Fall-Winter 2004, pp. 56-69.

⁶⁹ Joseph Cirincione, Jon B. Wolfsthal, and Miriam Rajkumar, *Deadly Arsenals: Nuclear, Biological, and Chemical Threats* (Carnegie Endowment for International Peace, 2005), p.266.

⁷⁰ Gerard C. Smith and Helena Cobban, "A Blind Eye to Nuclear Proliferation," *Foreign Affairs*, Vol. 68, No. 3, Summer 1989, pp. 53-70.

⁷¹ Shai Feldman, *Nuclear Weapons and Arms Control in the Middle East* (MIT Press, 1997), p.180.

⁷² Quoted in Eitan Barak, "Where Do We Go From Here? Implementation of the Chemical Weapons Convention in the Middle East in the Post-Saddam Era," *Security Studies*, Vol. 13, No. 1, Fall 2003, pp.106-155.

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⁷⁴ Robert G. Neumann, "Conventional Arms Exports and Stability in the Middle East," *Journal of International Affairs*, Vol. 49, No.1, Summer 1995, pp.183-202.