

## The Nuclear Arsenal in the Middle East

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Neither superpower is likely to start a nuclear war by attacking the other out of the blue. It is more likely that a conflict in a third world region between client states of the superpowers would escalate to a global scale. And the region where this escalation would most probably begin is the Middle East.

The dangers of escalation stem from the superpowers' involvement in the third world, particularly the arms trade. Most of the weapons used in conflicts in the third world are supplied by the United States and the Soviet Union. Because modern war uses weapons, particularly missiles, at a great rate, supplies must flow continually, as was shown dramatically in the October 1973 Middle East war. Both Egypt and Israel ran short of weapons within a few days; each was saved only by massive airlifts from its respective Soviet or American supplier. The arms supplier thus becomes the guarantor of its client's survival.

Neither the United States nor the Soviet Union can readily allow a client to be beaten in war or it will lose credibility as an ally. When Egypt faced defeat in the 1973 war, President Nixon risked escalation to all-out

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nuclear war by putting the U.S. Strategic Air Command on high nuclear alert to deter the Soviets from sending in troops.

Escalation to nuclear world war is most likely if a client state first resorts to its own nuclear weapons, and nuclear weapons are beginning to proliferate in the Middle East. Last October the London *Sunday Times* published the revelations of Mordechai Vanunu, the 31-year-old technician who worked for 10 years at Israel's nuclear establishment in Dimona and who was later abducted to Israel. Vanunu implies that Israel has a nuclear arsenal comparable to that of China, France, or the United Kingdom. Iraq has also sought to make a nuclear weapon, and Libya and Egypt have cultivated their nuclear technologies to the point where they could well make nuclear weapons. Even a subnational group such as the Palestine Liberation Organization (PLO) might produce a nuclear weapon.

Much of the Middle East's nuclear technology was imported from developed nations, ostensibly for power plants and other peaceful purposes. Nuclear-weapons proliferation will be checked only when developed nations take into account that any nuclear technology can be adapted to military use. Such technology should not be exported without safeguards to ensure that it is used for its intended purpose. And the superpowers must reduce their own nuclear arsenals if they expect client nations in the third world to forego acquiring such weapons.

### *Israel's Nuclear Program*

International interest in Israel's nuclear arsenal has been rekindled by Vanunu's revelations. Prior information from the U.S. Central Intelligence Agency suggested that Israel might have two dozen fission bombs of the type dropped on Nagasaki. *Time* reported that during the October 1973 war, Israeli Prime Minister Golda Meir ordered nuclear warheads deployed. There has been speculation that the Soviet Union responded by sending nuclear warheads to Egypt.

Before publishing Vanunu's story, the *Sunday Times* asked me to check its technical accuracy, and I was convinced. During our interview, Vanunu showed me some 60 photographs of the nuclear operations at Dimona and various models of the bomb. One photo showed the production of lithium deuteride, a compound used almost exclusively for thermonuclear, or fusion, bombs. His descriptions of plutonium processing were accurate, although they could have been gleaned from unclassified sources. His detailed descriptions of lithium-deuteride production, however, could have been gained only firsthand. Particularly convincing was his explanation of

how lithium-6, the isotope needed for thermonuclear weapons, is separated from ordinary lithium.

The fact that the Israelis lured Vanunu from London to Rome and abducted him to Israel for trial adds to his credibility. Israeli authorities would have been unlikely to mount a sophisticated intelligence operation and embarrass the Italian government if Vanunu's story were not true.

According to Vanunu, for 10 and possibly 20 years Israel has been producing about 30 kilograms of weapons-grade plutonium annually at Dimona. This means that the capacity of the reactor is about five times greater than it was previously thought to be. Vanunu also claims that about 4 kilograms of plutonium go into each Israeli nuclear weapon. Thus Israel could produce about 7 nuclear weapons a year and may now have well over 100.

Plutonium could be used to make fission weapons of the Nagasaki type. It is impractical to produce weapons of this type that will have a yield greater than 50,000 tons of TNT. (The Nagasaki bomb had a yield of about 20,000 tons of TNT.) Larger yields require thermonuclear bombs, which use fusion.

Vanunu's evidence of lithium-deuteride production at Dimona implies that Israel has thermonuclear weapons. These come in two types. In a "boosted" weapon, tritium and deuterium (isotopes of hydrogen) are put in the center of the plutonium sphere of a fission warhead. When the plutonium explodes, the tritium and deuterium fuse. Militarily usable boosted weapons have yields of 100 thousand to 200 thousand tons of TNT. In a "staged" device, the fusion material is placed outside the plutonium sphere, forming a second stage that is triggered by the fission explosion. Lithium deuteride, a solid at normal temperatures, is typically used. There is no theoretical limit to the explosive power of such weapons. Even without testing, Israeli scientists could be confident that a boosted weapon would explode. But they would want to test a staged device. In 1979 a U.S. satellite observed an event over the Indian Ocean that, some have speculated, could have been a joint Israeli-South African nuclear test.

As a thermonuclear power with some 100 nuclear weapons, Israel is in the same league with China, France, and the United Kingdom. Each has a few hundred nuclear weapons, including some thermonuclear weapons.

In 1963 France, not greatly concerned about providing nuclear-weapons technology to a then-friendly country, secretly supplied Israel with the Dimona reactor. The reactor may be fueled with natural uranium dug from the ground, which has 0.7 percent of the U-235 isotope that most easily undergoes fission. Or it may be fueled with uranium enriched to have a

slightly higher U-235 content. The spent fuel elements of a reactor contain unused uranium, radioactive fission products, and plutonium. France further helped Israel build a reprocessing facility to separate the plutonium from the rest of the used fuel, and this is the material that Israel uses for nuclear weapons. Apart from this initial assistance, Israel designed and manufactured its nuclear force indigenously.

Israel, and for that matter other Middle Eastern powers, could easily deliver nuclear weapons to targets in the region. Even a fairly crude modern nuclear weapon would probably weigh much less than 800 kilograms. It would contain a few kilograms of plutonium and some 200 kilograms of chemical high explosive that would create a shock wave to crush the plutonium, thus producing a chain reaction. Much of the remaining weight would go into a heavy metallic "tamper" around the plutonium, allowing more fissions and producing more energy. A combat aircraft such as a U.S.-supplied F-4 Phantom or an Israeli Kfir could carry several such weapons. The Israeli Jericho missile, with a range of about 200 miles, could carry one such warhead.

### *Why Did Israel Acquire Its Arsenal?*

With a population of 4.3 million, Israel is confronted by heavily armed Arab states with a total population of 90 million. Concerned with its security, Israel embarked on a nuclear-weapons program in the 1960s. Of course, the United States would not allow Israel to be devastated, not only because of the moral obligation imposed by the Holocaust, but also because Israel is the only true democracy and the strongest U.S. ally in one of the most strategically important areas of the globe. If America abandoned Israel, its other alliances, including NATO, would collapse. But Israel does not rely on such de facto guarantees. The memory that no country was prepared to help when Hitler murdered 6 million Jews makes Israelis doubt that any country would come to their aid if they were being pushed into the sea.

Because they depend on no other country in an emergency, Israelis want to be as self-sufficient as possible in weapons production, including nuclear weapons. This is especially true since both the United States and the Soviet Union have provided sophisticated weapons to Arab states, narrowing the technological gap between Israel and its enemies.

Some Israelis are bound to argue for improving nuclear weapons because Iraq has shown that it will use chemical weapons. Authoritative reports of the British Broadcasting Co. indicate that Iraq is producing 60 tons of

mustard gas per month, as well as 4 tons per month of each of the deadly nerve agents Sarin and Tabun. Syria and Egypt may also have chemical weapons. Like nuclear bombs, these are weapons of mass destruction. NATO policy holds that a chemical attack on cities would justify nuclear retaliation, and Israel would probably respond similarly. However, the BBC also reports that Israel is itself producing chemical weapons.

Most commentators assume that Israel's nuclear weapons are intended as a last-ditch deterrent to military moves by Arab nations that would threaten Israel's existence. But this does not account for the size and quality of Israel's nuclear weapons. Israel could provide adequate deterrence by targeting ordinary fission weapons on major Arab cities—a dozen weapons the size of the Nagasaki bomb would suffice. No Arab city is big enough to “justify” a thermonuclear weapon.

Could Israel want a tactical nuclear arsenal—to be used, for example, against an Arab tank attack—as well as a strategic deterrent? The United States produces neutron warheads—fusion weapons designed to release high-energy neutrons to irradiate and kill tank crews. But they are basically ineffective. A simple plastic cover impregnated with boron can absorb most of the neutrons and protect the tank crew. If tanks are spaced a typical 200 meters apart, only one tank on average will be caught by a neutron warhead of reasonable yield. Finally, even if tank crews have been exposed to enough radiation to kill them, they are likely to survive for at least a few hours. During that time they would probably run amok, kamikaze fashion, doing far more damage than they would otherwise. The competent Israeli military knows the limitations of neutron warheads, and would surely prefer to purchase far more cost-effective conventional antitank weapons.

It is hard to imagine any legitimate tactical use for Israeli nuclear weapons. The country is so small that fallout from any detonation of nuclear weapons in the Middle East would be a major hazard for Israeli troops and civilians.

Israel has probably produced its relatively large and sophisticated nuclear force primarily because of the technological momentum of the nuclear-weapons program. To design, develop, and produce its weapons, Israel had to form a team of nuclear scientists and technologists. Such professionals want to continue pushing forward the frontiers of their field. They may sincerely believe that national security depends upon the next advance in military R&D, while bureaucratic and economic forces add to their zeal.

Other nuclear-weapons powers follow this same pattern. There is no rationale for any country to produce high-yield thermonuclear weapons.

The American nuclear-weapons scientist J. Robert Oppenheimer pointed out in the late 1950s that boosted nuclear fusion weapons are powerful enough to destroy any conceivable target. But Oppenheimer was silenced, and the U.S. nuclear-weapons community, closely followed by its Soviet counterpart, went on to produce megaton thermonuclear weapons. The United Kingdom, France, and China came next, and Israel now seems to have followed.

### *Arab Nuclear Weapons*

Israelis naturally differ as to the wisdom of possessing nuclear weapons, and some of their views are surprising. For example, several otherwise dovish factions of the Labor Party are pronuclear because they believe that Israel can give up the West Bank if it has the security of nuclear weapons. And some hawkish factions, headed, for example, by former Defense Minister Ariel Sharon, are antinuclear because they want to increase Israel's conventional military strength.

Israel's official policy is to keep its nuclear-weapons capabilities ambiguous. No Israeli leader has ever admitted that the country has nuclear weapons. A statement by former Minister of Defense Moshe Dayan in June 1981 is one of the most explicit to date: "We are not going to be the first ones to introduce nuclear weapons into the Middle East, but we do have the capacity to produce nuclear weapons," Dayan said. "If the Arabs are willing to introduce nuclear weapons into the Middle East, then Israel should not be too late in having nuclear weapons too." The statement did not make clear whether Israel merely had the necessary technological capacity, or whether it had components ready to assemble into warheads.

Such a policy has served Israeli purposes. Firm knowledge that Israel has a nuclear arsenal larger than needed for deterrence would encourage Arab states to acquire nuclear weapons, and would increase the likelihood of a preemptive Arab attack against Israeli facilities related to nuclear weapons. It would also prompt the Soviets to guarantee their Middle Eastern allies nuclear retaliation against an Israeli nuclear attack. And not least, proof of a sophisticated Israeli arsenal would complicate Israel's relations with the United States. In particular, Congress could become reluctant to supply Israel with sophisticated conventional weapons.

How will Arab nations react to Vanunu's statements implying that Israel's nuclear-weapons capability rivals that of France, England, or China? Even if technological momentum is the real reason for such developments, Arab states will assume that Israel seeks an overwhelming first-strike

capability, since nations inevitably assume the worst when judging enemy intentions. Consequently, Arab states are likely to accelerate the development of their own nuclear capability. Of course, they might acquire nuclear weapons even if Israel had none.

There are relatively few obstacles to acquiring such weapons. Any Middle Eastern country could obtain natural uranium. Using materials purchased on the open market, it could clandestinely construct a small nuclear reactor fueled by natural uranium and cooled with graphite blocks. Such a reactor could produce a few kilograms of plutonium a year, enough to make a weapon the size of the Nagasaki bomb. A small reprocessing plant to remove the plutonium from the irradiated reactor fuel could also be built. Reprocessing is economically difficult on a commercial scale, but on a small scale it entails only straightforward chemistry. To make the bomb itself work, the chemical high explosives used to compress the plutonium and produce a chain reaction must be detonated with microsecond precision. This is the most difficult part of making a bomb, but a Middle East nation could succeed in doing it. The reactor, the processing plant, and an area to construct nuclear weapons of the Nagasaki type could be housed in a three-story building.

A Middle Eastern country could secretly produce such weapons, and would require only a few to destroy Israel. In fact, three nuclear weapons targeted on Tel Aviv, Haifa, and the coastal region between them would be enough to decimate Israel's main population centers and industry, and to destroy its most important military command centers.

Iraq, Egypt, and Libya have significant nuclear-energy programs that, if carried through, would enable them to construct nuclear weapons. Iraqi nuclear ambitions were set back in June 1981 when Israel bombed the French-supplied Osirak research reactor. Israel feared that Iraq could make nuclear weapons from the highly enriched uranium supplied by France to fuel the reactor or the plutonium produced in it. Israel's attack accorded with one of its main foreign-policy goals: to prevent the emergence of any new nuclear-weapons power in the Middle East.

Iraq's nuclear plans have also been hindered by the war with Iran, but after the war Iraq will presumably revitalize its program with French or Soviet assistance. Meanwhile, Iraq could use the enriched uranium fuel to make a nuclear weapon. Leonard Spector, an analyst of nuclear proliferation at the Carnegie Endowment for International Peace, has reported Iraqi attempts to buy plutonium illegally. Even one nuclear weapon could kill a large proportion of Israelis, and the fallout from a ground-level explosion could render much of the country uninhabitable.

Several facts suggest that Libya may be able to produce nuclear weapons within a decade. Libya plans to import nuclear reactors from the Soviet Union, and numerous students are receiving training abroad in nuclear science and technology. Libya operates a research reactor at Tajoura and has secretly provided Pakistan with nuclear assistance, including uranium obtained from Niger. Furthermore, Libya has agreements with Argentina and the Soviet Union to collaborate in developing nuclear technology. The agreements ostensibly pertain to peaceful uses, but the technology always has some military applicability. Libya's implacable hatred of Israel and support of international terrorism make its prospect of securing nuclear weapons fearsome.

Egypt would have little difficulty building nuclear weapons once it acquired a stock of plutonium. The country already has a cadre of nuclear scientists and engineers. By 1961 it had a research reactor and a flourishing nuclear research center. It is now considering bids for one or two reactors to be built near Alexandria, and it optimistically plans to build a total of eight reactors over the next 20 years.

Egypt has used political means to thwart Israeli acquisition of nuclear weapons. In the late 1960s, President 'Abd al-Nasir secured Soviet promises of nuclear retaliation against a nuclear attack on Egypt. President Anwar Sadat sought similar U.S. guarantees in the early 1970s. Egypt has threatened Israel with a preemptive attack on nuclear-weapons facilities, and has said that it would respond to an Israeli nuclear arsenal by producing its own nuclear weapons. Egypt recently proposed that Israel join in establishing a nuclear-weapon-free zone in the Middle East.

This political approach makes sense only while Israel's nuclear policy remains ambiguous. Once the Arab world believes that Israel has a sophisticated nuclear arsenal, the policy will no longer be credible. Will Egypt then build nuclear weapons, despite the risk that Israel would destroy the production site?

The danger of preemptive attacks against nuclear-weapons sites makes the Middle East particularly unstable. A large-scale Israeli deployment of nuclear weapons could provoke a preemptive Arab attack against production sites, arsenals, and command centers. Israel would almost certainly respond to any Arab attempt to acquire nuclear weapons with a military strike such as the one on Iraq's reactor. As it loses technological superiority in conventional weaponry, Israel will be increasingly tempted to destroy suspected Arab facilities before they can produce enough material for a nuclear weapon. A preemptive strike by either side could lead to war.



The Middle East is also home to subnational groups such as the PLO. Given weapons-grade material, even these groups could make a nuclear explosive. As the U.S. Congressional Office of Technology Assessment has concluded, "A small group of people, none of whom would ever have had access to the classified literature, could possibly design and build a crude nuclear device. . . . Only modest machine-shop facilities that could be contracted for without arousing suspicion would be required. The financial resources for acquisition of [the] necessary equipment on open markets need not exceed a fraction of a million dollars."

### *What Can Be Done?*

Despite the intimate relationship between the military atom and the peaceful atom, nuclear industries in the advanced countries—including the United States, France, West Germany, the United Kingdom, Italy, Japan, and the Soviet Union—are energetically trying to export nuclear power facilities to the Middle East. Except in France and the Soviet Union, nuclear industries need export orders to survive because of the lack of domestic orders for nuclear plants. And countries like France and Italy are exporting nuclear facilities and know-how to Arab countries to obtain guaranteed oil supplies.

Developed nations should not export nuclear technology unless the recipient nation signs the 1970 Nuclear Non-Proliferation Treaty (NPT) or agrees to nuclear-facility inspections required by the treaty. Such inspections help prevent the peaceful atom from being turned to military purposes.

Unfortunately, it would be almost impossible to enforce an adequate inspection system in the Middle East. The fact that some European countries are hostages to Arab oil puts pressure on them to export nuclear facilities and material to the region without adequate safeguards. Moreover, Israel will not accede to nuclear-facility inspections or sign the NPT. Doing so would require Israel to give up its nuclear advantage just when its technological lead over Arab nations is diminishing. For the same reason, the Egyptian-Israeli negotiations to achieve a nuclear-free zone in the Middle East are almost sure to flounder.

The nuclear-weapons powers could make a significant contribution toward slowing the proliferation of nuclear weapons around the world. These powers are constantly upgrading their arsenals, showing that they believe in the political and military value of nuclear weapons. They should

not be surprised when other countries follow their example and acquire their own such weapons.

The need to stop nuclear proliferation is one of the strongest arguments for arms control. The NPT obligates the Soviet Union and the United States to take significant steps toward reversing the arms race and achieving nuclear disarmament. A comprehensive test ban would be a good first step. If the superpowers wish to halt nuclear proliferation in the long run, they must follow such a ban with actual nuclear disarmament.