

Plutonium in the Textile Plant: Israel and America at the Dawn of Non-Proliferation

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Abstract

Beginning in approximately 1954, Israel initiated a military nuclear program in an attempt to secure its permanent national security. In 1967, it would succeed by producing its first nuclear warhead. In the intervening thirteen years, Israel engaged in a cat-and-mouse game with the United States, in which Israel successfully evaded and confounded various earnest but ill-fated American attempts at espionage and arms control. This paper investigates the primarily American attempts to obstruct the Israeli nuclear program, and the methods by which Israel outmaneuvered American intelligence and arms controls. It finds that while America genuinely sought to block the Israeli nuclear program, the complexity and novelty of the problem of comprehensive arms control ensured that American spies, scientists, and diplomats were not prepared to detect and block the Israeli program. In particular, flaws in the American approach to the fields of intelligence collection, on-site inspections, and international export/materiel controls doomed the American objective of a non-nuclear Israel to failure.

§1. Introduction

In July of 1960, an Israeli oilman accidentally brought the existence of the three-year-old covert Israeli military nuclear program at Dimona to the CIA's attention.¹ The closing months of Eisenhower's administration saw a flurry of diplomatic and intelligence work as the Americans sought to confirm that what they had originally been told was a textile factory was, in fact, the home of Israel's pursuit of the nuclear bomb. In December, the State Department would publicly announce that they had uncovered a secret Israeli nuclear site in the desert. In the years that followed, John F. Kennedy would describe the program as his personal nightmare, and relentlessly sought to prevent the Israelis from attaining a nuclear weapon.²

Later, in 1968, a CIA intelligence estimate posited that the Israelis had not yet undertaken a full military program, and were still a handful of years away from attaining a nuclear warhead.³ This estimate had one small flaw: the Israelis had already successfully produced two rudimentary nuclear warheads the year before, just prior to the Seven Days War. Despite facing a barrage of inspections, satellite surveillance, espionage attempts from both NATO and Warsaw Pact spy agencies, international export controls, and even a suspected (and abortive) Soviet plot to secretly bomb the program out of existence,⁴ Israel became the sixth country to weaponize the power of the atom. More impressively, it did so without the vaunted CIA even realizing.

¹ Avner Cohen and William Burr, "The Eisenhower Administration and the Discovery of Dimona: March 1958-January 1961," *National Security Archive*, 15 April 2015.

² U.S. Joint Atomic Energy Intelligence Committee. "Post-Mortem on SNIE 100-8-60: Implications of the Acquisition by Israel of a Nuclear Weapons Capability." Classified intelligence estimate, 31 January 1961. From George Washington University's National Security Archive, *The Nuclear Vault: The US Discovery of Israel's Secret Nuclear Project*. Posted 15 April 2015. (accessed 5 May 2018).
<https://nsarchive2.gwu.edu/nukevault/ebb510/docs/doc%2027A.pdf>

³ "Special National Intelligence Estimate Number 11-12-68: Emplacement of Weapons of Mass Destruction on the Seabed." Classified intelligence estimate, 15 August 1968. From the Central Intelligence Agency, *Freedom of Information Act Electronic Reading Room*. Document released 28 September 2009. (accessed 21 April 2018).
<https://www.cia.gov/library/readingroom/document/0001211143>

⁴ Isabella Ginor and Gideon Remez, *Foxbats Over Dimona: The Soviets' Nuclear Gamble in the Six-Day War*, (New Haven, Yale University Press, 2007).

This raises one large question: How did the Israelis get away with building a nuclear weapon, without the Americans realizing it until years after it was complete? Any attempt to tackle the problem encounters a number of subsequent questions. What were America's true primary foreign policy objectives in the region? How much did the Americans and their allies truly care about stopping the Israeli program? How much did they care about the supposed international nonproliferation regime? Why did nonproliferation efforts succeed in subsequent years in places like Japan, South Korea, Western Germany, Brazil, and South Africa but fail in Israel? How and why were the Americans in the dark about something as important as the success of the Israeli proliferation attempt, and were all the NATO allies unaware as well? What did the countries in the rest of the region know, and how did they react to the emergence of an Israeli nuclear warhead?

These questions are not merely a matter of historical accounting. They bear heavily on both contemporary geopolitical interests as well as our understanding of the crucial nuclear dimension of the Cold War. International attempts to contain nuclear programs in the Middle East continue to this day; it is vital to understand how nuclear programs develop, and how they evade attention. Conversely, it is equally important to evaluate why the tools of detection either failed or were not present in the Israeli program. Regardless of whether prevention was the ultimate goal, it is undeniable that American detection efforts—the essential precursor to prevention—completely failed.

Whether prevention was indeed the ultimate goal, on the other hand, carries with it powerful historical information. The Treaty on the Nonproliferation of Nuclear Weapons was produced in 1968, entered into force in 1970, and is today signed by each of the nuclear-armed members of the UN Security Council. The NPT emerged simultaneously with the Israeli nuclear

bomb, and is a product of the same era. If America's foreign policy apparatus tacitly allowed the Israeli program to proceed—or if it simply did not care—such intentional negligence would cast a long shadow on America's ostensible primary commitment to nonproliferation. Yet if America indeed failed in earnest, it casts an equally-deep shadow upon the American intelligence community during the height of the Cold War.

This paper will primarily seek to provide an answer for why America's efforts, which this paper contends were largely genuine and determined, failed to stop the creation of an Israeli nuclear weapon. It argues that there were fatal flaws in the means of implementation for each of the four main non-military tools of nonproliferation policy available at the time: intelligence collection, export control, inspection, and sanctions. Crucially, contemporary policymakers were not aware of the flaws in their first three tools. Specifically, intelligence collection efforts suffered from multiple different systematic intelligence failures. In turn, these intelligence failures undermined attempts at organized control over the export of nuclear technology and materiel. Inspections, while attractive and frequently proposed, lacked an effective methodology for detecting proliferations efforts as of the early 1960's. Sanctions were infeasible, and risked starting an arms race. Had the failures in these methods been corrected, nonproliferation efforts very well could have succeeded; they were in no sense doomed from the start by broader geopolitical circumstances.

§2. *Historiography and Sources*

Avner Cohen's *Israel and the Bomb*⁵ is widely considered to be the seminal history of the Israeli nuclear program, and as such, this paper both draws on its research and engages with its

⁵ Avner Cohen, *Israel and the Bomb*, (New York, Columbia University Press, 1998).

arguments. Unlike authors writing in the political science literature, Cohen seeks less to answer questions about the implications of the program, and more to develop a reconstruction of the sequence of events which happened.⁶ As such, his argument about America's approach to Israel's program is much more implicit. Cohen strongly contends that President John F. Kennedy cared deeply about the nuclear program and nuclear proliferation. He opens his discussion of Kennedy's policy by noting that nuclear proliferation was Kennedy's "private nightmare," and catalogued the many efforts of Kennedy to obstruct the program. However, as Cohen sets out to describe what did happen with as much accuracy as possible, he fails somewhat to evaluate what did not happen, but could have. He makes no arguments about whether Kennedy's efforts were everything that could have been done, and whether they were undertaken in good faith. In short, Cohen creates a difficult scholarly conundrum, as his evidence substantiates the claim that Kennedy wanted to stop the program, but his description of American efforts fails to provide any answers to questions from an array of different authors about why these ostensibly good-faith efforts were so lackluster.

Ross's *Doomed to Succeed*⁷ provides unique insight into the history of the American-Israeli relationship by examining the relationship specifically through the lens of each American president, from Israel's foundation to modern day. As a result, he makes an insight that seems to be absent in many other arguments: in his view, American policy towards Israel changed radically between different presidential administrations. Specific to the case of the early nuclear program, Eisenhower differed substantially from Kennedy, who differed greatly from Lyndon B.

⁶ As an aside, Cohen comes from a tradition of anti-positivist history writing, and is cognizant of the contradiction between his general approach to history and his specific approach to this book. He writes in the introduction, "I believe that the history I offer is about what 'actually' happened. I also recognize that it is ultimately a 'story', and all stories are mere interpretations." (Cohen, *The Bomb*, 9.)

⁷ Dennis Ross, *Doomed to Succeed: The U.S.-Israel Relationship From Truman to Obama*, (New York, Farrar Straus and Giroux, 2015).

Johnson. The latter difference had major impacts on Israel's nuclear program. Ross agrees with Cohen that Kennedy cared deeply about the nuclear program, and intended to run a hard line on the program. However, he claims that "Lyndon Johnson would inherit the issue, and essentially choose to fudge it." His chapter on Johnson is shorter than many other chapters, specifically because the Johnson administration's foreign policy was consumed by Vietnam and Soviet relations; there simply was no oxygen left in the room for a coherent, effective Israel policy.

This paper will interact with Cohen and Ross's works, as well as those of Gerlini, Carson, Long & Shifrinson,⁸ and a number of others by presenting a new perspective on American non-proliferation efforts focused on examining the specific mechanisms which caused the failure to detect and prevent the Israeli nuclear program. Where Cohen sought to describe what America did try to do, this paper will often examine what it did not do. It will do so by inspecting the opportunities that America and its fellow non-proliferators had but did not take, and why it did not take them. Few authors have directly focused on the specific tools and actions that the Americans used in pursuit of nonproliferation, and this paper will center itself on those tools and why they failed so completely. This paper will examine specific incidents of failure, including the Israeli-Argentine yellowcake uranium sale of 1965, when a sale of dozens of tons of uranium slipped entirely by America's ostensibly international export controls, and the 1962 inspections of Israel's Dimona facility, where the Israelis successfully convinced the Americans that no below-ground facility existed by (amongst other things) temporarily putting brick walls in front of all of the elevators.

⁸ Each of the papers by Gerlini, Carson, and Long & Shifrinson has a different perspective on why America responded as it did, and their views will be described in greater depth in the following section on American intentions.

This paper's primary sources largely involve declassified government records of various sorts. First amongst these are communiques within and between governments. Many of the biggest questions revolve around what people actually knew and when they knew it, and so documents recording the transmission of information are vital for informing who knew what, and who did not. Such communiques between governments also shed light on the aims of different governments, and both where and why they differed. Further, internal documents often include commentary, which provide a window into what the people who both sent and received these documents thought of the situation they comment on. Internal directives are equally useful. Documents such as the instructions given to the first American inspectors of the Dimona site shed light on what inspections actually entailed at the time to powerful, central institutions like the State Department. Another crucial record type is the intelligence assessment. These declassified documents were often reflective, particularly post-mortems that sought to determine why certain efforts failed. Finally, personal interviews and transcripts of conversations with government officials are invaluable, as well as the diary entries of both John F. Kennedy and David Ben-Gurion, which are both available publicly in limited form. Diaries are of particular use, as they have the unique authorial bias of not seeking to represent oneself to the world, but instead depict how the author would like to represent the world to themselves. Through analysis of these disparate sources, this paper seeks to reconstruct the sequence of events that took place between July of 1960 and May of 1967 that can best explain how and why Israel succeeded where so many others failed.

This paper will proceed through each of the possible main explanatory factors for America's failure to stop the Israeli nuclear program. First, it will examine the the literature surrounding America's approach, and argue that America did actually have the theoretical

capacity and interest to stop Israel's nuclear program. Second, it will discuss Israel's long-term military nuclear aims as they were constructed by Israel's leadership in the early 1950's. Third, it will examine how and why America was not, at the time, prepared to either effectively perform inspections, nor make use of what they gained from inspections in Israel. Fourth, it will investigate how systematic intelligence failures undermined both policy generally as well as nuclear export controls in particular. It will briefly discuss how the possibility of sanctions was undermined in part by the geopolitical situation, and in part by the aforementioned failures in intelligence collection and analysis. It will then conclude with a short discussion of some of the possible long-term impacts of the Israeli-American battle of evasion and detection on the practice of nonproliferation.

§3. American Intentions

In the broader public, most individuals are unaware that America knew some information about Israel's nascent nuclear program as early as 1960. This is likely because America's actions are admittedly somewhat hard to explain in a full historical context. Various academics have made attempts to understand how tiny Israel evaded the military and espionage might of the mid-20th century American empire, and their interpretations fall into two main camps.

The first camp takes one side of the prevailing academic debate over the early Israeli program: that America knew about the nuclear program, but decided not to intervene to stop it. Writers subscribing to political relationship theory suggest that America sought to secretly enable Israel's nuclear program, and only sought inspections in order to maintain a public appearance of nonproliferation to keep the calm and maintain norms. Gerlini⁹, for example, falls

⁹ Matteo Gerlini, "Waiting for Dimona: The United States and Israel's development of nuclear capability," *Cold War History* 10, no. 2 (2009): 143-161. DOI: [10.1080/14682740903162300](https://doi.org/10.1080/14682740903162300)

into this camp, arguing that inspections agreements were a means to averting an Arab-Israeli war.

Meanwhile, the second camp includes the writers who argue that American nonproliferation efforts were genuine, but ultimately failed or could not succeed, for a variety of reasons. These reasons range from poor policymaker-intelligence community communications, as in Long & Shiffrinson,¹⁰ to a simple inefficacy of the diplomatic tools used to try to stop proliferation, as in Kroenig.¹¹ Others fall somewhere between these two camps: Ross contends that Israel's eventual success was largely a consequence of LBJ, as he put it, "essentially choosing to fudge it"¹² and put it on the backburner due to other priorities, despite Kennedy's strong efforts. Carson & Carnegie¹³ fall relatively close to the first camp when they argue that America chose not to expose the program specifically because of an American belief that any attempt to roll back the program would fail, and so instead sought to preserve international norms of nonproliferation. The following section will mainly discuss the merits of the first camp's position, as this paper generally proposes a modified version of the second camp's viewpoint.

One major question must be answered before asking what exactly went wrong in the efforts to stop the Israeli nuclear program. One must ask: did the Americans actually try to stop the Israeli program? This paper will conclude that blocking Israeli nuclear proliferation was a true priority, particularly during the Kennedy administration. However, given that America did

¹⁰ Austin G. Long and Joshua R. Shiffrinson, "How long until midnight? Intelligence-policy relations and the United States response to the Israeli nuclear program, 1959–1985," *Journal of Strategic Studies* 42, no. 1 (2018): 1-36. DOI: [10.1080/01402390.2018.1439746](https://doi.org/10.1080/01402390.2018.1439746)

¹¹ Erik Gartzke, Neil Narang, and Matthew Kroenig, *Nonproliferation Policy and Nuclear Posture: Causes and Consequences for the Spread of Nuclear Weapons*, (New York, Routledge, 2017), 31.

¹² Ross, *Doomed to Succeed*, 69.

¹³ Allison Carnegie and Austin Carson, "The Spotlight's Harsh Glare: Rethinking Publicity and International Order," *International Organization* 72, no. 3 (2018): 1-31. DOI: [10.1017/S0020818318000176](https://doi.org/10.1017/S0020818318000176)

not stop the program despite America's significant geopolitical weight, it is worth exploring further. First, America had the capacities to intervene, should it have wished to do so. This then raises the question of intent. America was a global superpower, an economic, military, and technological hegemon. It sat atop a massive alliance structure and an extremely sophisticated intelligence community. America became aware of the existence of a secret program in 1960, and the reactor at Dimona would not go critical for another four years. A nuclear bomb would not be ready for nearly three years after that. The conventional rationalist literature would suggest that such capacities would lend itself towards an at-will ability to stop the development of a nuclear weapon in a smaller, all-around weaker state.¹⁴

Notably, America had specific leverage over the Israelis, in both the form of the carrot and the stick. The successful application of American pressure following the Israeli military invasion of Egypt during the Suez Canal crisis is a useful example of the very big stick wielded by America. Eisenhower threatened Ben-Gurion with the total withdrawal of millions of dollars of American aid,¹⁵ massive retaliatory United Nations sanctions, and even the sanctioning of donations from the American Jewish community. He withdrew desperately-needed loans from the French and the British due to their covert support of the Israeli action. Eisenhower even directly led the introduction of a resolution in the UN's General Assembly calling on all member states to suspend all aid, after France and the UK blocked the resolution in the Security Council. Subsequently, France and Britain backed down, quickly followed by Israel, which agreed to the ceasefire terms and IDF withdrawal in principle.¹⁶

¹⁴ Nicholas L. Miller, "The Secret Success of Nonproliferation Sanctions," *International Organization* 68, no. 4 (2014): 913–44. doi: [10.1017/S0020818314000216](https://doi.org/10.1017/S0020818314000216).

¹⁵ Ross, *Doomed to Succeed*, 29.

¹⁶ *Ibid.*, 35.

America also had a powerful incentive it could offer the Israelis, which they desperately desired: advanced weapons systems capable of countering Nasser's military armed with cutting-edge Soviet weaponry. The Israelis repeatedly sought to obtain advanced American weaponry. Most notably was the Hawk anti-aircraft missile, which could have been made available as early as 1961, given how critical it would be to buying time for mobilization in any defense against the sizable Egyptian air force.¹⁷ The Israelis felt themselves to be outmatched, encircled, and desperate, to the point that Ben-Gurion practically begged Eisenhower for the armaments assistance: "Israel today is the last refuge of our people, even as at the dawn of history it was our first homeland... Every day that passes without our receiving from your country or her allies planes and tanks, not inferior in quality to those supplied to Egypt from Soviet sources—brings the danger ever closer and deepens the feeling that we are being abandoned by our closest friends."¹⁸

An American National Intelligence Estimate (NIE) on various possible proliferation efforts would also later contend that the Israelis, should they pursue a nuclear weapon, would likely do so because of their lack of conventional weapons superiority, or even parity, to the Arab states. It suggested that this scenario would have "better than even odds" of coming about should America fail to provide strong military assistance and/or credible security guarantees to the Israelis,¹⁹ and implies that provision of American military technology could avert a drive to a weapon by the Israelis. Indeed, there is some irony that this 1964 National Intelligence Estimate

¹⁷ Ibid., 42.

¹⁸ David Ben-Gurion, "Letter from Prime Minister Ben-Gurion to President Eisenhower." February 14, 1956. From US State Department, *Foreign Relations of the United States 1955-57*, vol. 15, no. 103, 185-87. (accessed May 24, 2018). <http://history.state.gov/historicaldocuments/frus1955-57v15/d103>

¹⁹ "National Intelligence Estimate 4-2-64: Prospects for a Proliferation of Nuclear Weapons Over the Next Decade." 10. Classified intelligence estimate, 21 October 1964. From the Wilson Center Digital Archive, *Israeli Nuclear History*. Obtained from the CIA Mandatory Review Appeal and contributed by William Burr. <http://digitalarchive.wilsoncenter.org/document/115994>

accurately predicted events that did in fact happen, albeit seven years prior to its creation, as the Israelis had fully constructed their Dimona facility and were well on their way to a nuclear bomb by the time of the circulation of this NIE. This sort of incentive had the added benefit of privacy: America could guarantee Israeli security and provide extensive military technology in exchange for a quiet, verifiable end to the suspected Israeli nuclear program.

As such, there is a strong argument to be made America was entirely capable of taking the actions necessary to stop proliferation, by one means or another, in the many years of American semi-awareness of the Israel program. Yet overt steps like these, with either incentives or punitive measures, do not appear to have been taken – or at least, not taken with the same forcefulness as Eisenhower’s response to the Suez canal crisis, or modern nonproliferation efforts. A heavy reliance on inspections appears as mere appeasement to manage fears by Arab states at risk of falling into the Soviet orbit. Therefore, some conclude (as mentioned above, Gerlini, subscribers of political relationship theory, etc.) that American interests in Israeli non-proliferation were either limited, or secondary concerns to matters like averting an Arab-Israeli war.

However, substantive evidence suggests that Kennedy, at minimum, was deeply concerned and committed to the cause of ensuring non-proliferation as a top-level priority. On the individual level, Kennedy considered Israeli acquisition of nuclear weapons to be his “personal nightmare.”²⁰ On a policy level, he threatened to sever the American-Israeli relationship altogether should Ben-Gurion fail to allow regular inspections.²¹ Conversely, he specifically created the idea of a “special relationship” in order to hint towards an American security guarantee if Israel calmed American fears of a nascent Israeli nuclear weapon. Kennedy

²⁰ Gartzke et. al., *Nuclear Posture*, 36.

²¹ Ross, *Doomed to Succeed*, 69.

then went further, and extended an offer to sell advanced American military technology to Israel – the Hawk anti-aircraft missiles, specifically – on the condition that Israel allow the American Atomic Energy Commission to verify that the nuclear program at Dimona was peaceful.²²

More generally, non-proliferation was a consistent interest across American administrations and across all types of relationships. Truman blocked British access to Manhattan Project data after ascending to the presidency. Eisenhower led the creation of the IAEA and pushed for it to have a comparatively strong enforcement role, and imposed export restrictions of nuclear technology on France.²³ Kennedy and his administration avoided assisting the French nuclear program, even after it was a *fait accompli*, for fear of the West Germans starting a program of their own.²⁴ Declassified intelligence documents, including those discussing allies, refer consistently to “Nth country programs” as a major independent policy concern. American leverage and political will can generally be accounted for. Therefore, what remains left to explain the failure is in the implementation of its non-proliferation tools: inspections, intelligence collection, export controls, and sanctions.

§4. Israeli Aims

Having examined America’s interests with regards to the Israeli nuclear program, it is clearly worth addressing what Israel’s goals were with respect to their pursuit of a military

²² Ross, *Doomed to Succeed*, 67.

²³ John Foster Dulles & Selwyn Lloyd. "Memorandum of Conversation between John Foster Dulles and Selwyn Lloyd, 'Atomic Energy Items: (1) French Request (2) Test Limitation'." 23 March 1957. From The Wilson Center, *History and Public Policy Program Digital Archive*. Obtained from the National Archives, Record Group 59, Records of the Department of State, Executive Secretariat Conference Files, 1949-72, box 127, CF 861 Bermuda 1957 Memcons. Obtained and contributed by William Burr and included in NPIHP Research Update #2. <http://digitalarchive.wilsoncenter.org/document/110063>

²⁴ John F. Kennedy. "Department of State Cable 5245 to Embassy United Kingdom, Message from President Kennedy to Prime Minister Macmillan." 8 May 1961. From the Wilson Center, *History and Public Policy Program Digital Archive*, via FOIA release. Obtained and contributed by William Burr and included in NPIHP Research Update #2. <http://digitalarchive.wilsoncenter.org/document/111184>

nuclear program, and with respect to their committed strategy of evading American detection. Fundamentally, both the pursuit of a nuclear weapon and the shroud of secrecy surrounding that pursuit emerged in the earliest years of the Israeli state. David Ben-Gurion, the first prime minister of Israel, was dedicated to the pursuit of a nuclear weapon. Within the first year of Israeli statehood, even while the Independence War was still concluding, Ben-Gurion was meeting with Jewish reactor scientists from around the world and discussing plans at the highest levels to recruit French aid to a military nuclear program.²⁵ The dream of an Israeli nuclear bomb was born at the same time as the Israeli state itself, and David Ben-Gurion was the most powerful driving force in both.

Ben-Gurion was fully aware that Israel was not a wealthy, powerful state, unlike the others that developed a nuclear bomb in the immediate aftermath of World War II. Many scientists in Israel, such as those at the nascent Weizmann Institute of Science, believed it was basically impossible for Israel to build a nuclear reactor without foreign assistance, not to mention a whole nuclear program.²⁶ Indeed, they wondered, with what scientists? At its founding, Israel's endowment in terms of wealth and established academia was virtually nil. Yet David Ben-Gurion maintained a firm (and rather racialized) belief in the power of "the Jewish brain,"²⁷ and consistently believed that the path to national security for Israel was inextricable from Israeli science. This led Ben-Gurion to richly fund the sciences within Israel, and personally support and direct sending promising Israeli physics students to study abroad. Ben-Gurion's policies effectively served to slowly construct a powerful scientific establishment in Israel completely from scratch.

²⁵ Cohen, *The Bomb*, 25.

²⁶ Cohen, *The Bomb*, 39.

²⁷ Cohen, *The Bomb*, 13.

Relatedly, David Ben-Gurion was keenly aware of the dangers the new Israeli state faced. Israel's early civilian and military leaders (not incorrectly) believed themselves to be outmanned, outgunned, and surrounded. Abdul Gamal Nasser, the charismatic pan-Arab leader of Egypt, was of particular concern to the Israelis. The Israelis survived the Independence War in part because of resolve and strategy, but realistically, much more so because of the uncoordinated and haphazard campaigns of the Arab states during the war. Archival research in the 1980s by the group referred to in Israel as the "New Historians" demonstrated as much. The archives of the Israeli foreign ministry generally showed a picture of the Arab states in 1948 as thoroughly disunified. Each directly negotiated with the Israelis for individual peace terms, and even anxiously sought to pre-empt each other in a bid for the best peace terms before the war.²⁸ As the Israelis saw it, if Nasser succeeded in his campaign to unify the various Arab states into one massive nation-state, Israel would be utterly annihilated if such a state were to fight Israel in a conventional war. Israel spent the first two decades of its existence under the shadow of Nasser, perennially aware that the destruction of Israel in a rapid conventional war with its neighbors could be just around the corner. Indeed, this looming danger even took a large psychological toll on Ben-Gurion;²⁹ during his last years in office in the early 1960s, he would tell one of his aides, "I could not sleep all night, not even for one second. I had one fear in my heart: a combined attack by all Arab armies."³⁰

As a result of the ever-present fear of war with a unified Arab state, Israel's pursuit of nuclear physics research was directed towards military applications from the outset. Years before Israel began to cooperate extensively with France's defense bureaucracy, Israel briefly attempted

²⁸ Avi Shlaim, "The War of the Israeli Historians," *Annales* 59, no. 1 (2005): 162.

<http://users.ox.ac.uk/~ssf0005/The%20War%20of%20the%20Israeli%20Historians.html>

²⁹ Cohen, *The Bomb*, 12.

³⁰ Michael Bar-Zohar, *Ben Gurion*, (Tel Aviv, Zmora Bitan, 1987): vol. 3, 1365.

to obtain a militarized nuclear reactor through Eisenhower's Atoms For Peace program. Ernst David Bergmann, the head of the Israel Atomic Energy Commission (IAEC), was a strong proponent of a plan in 1955 to negotiate for a modified research reactor via the Atoms For Peace program. The modifications planned by Bergmann and the IAEC were oriented towards enabling work with "the new elements, such as plutonium,"³¹ which has primarily military applications. This was a clear and deliberate attempt to covertly acquire weaponizable plutonium through a cleverly-disguised Atoms For Peace program -- hiding in plain sight, as it were.

Unfortunately for Bergmann, such a plan indeed would have been seen in extremely plain sight as an attempt at obtaining a nuclear warhead. Amos de Shalit of the Weizmann Institute attended the first Geneva Conference on the Peaceful Use of Atomic Energy in August of 1955; on the 28th of August, he sent back a letter effectively seeking to scrap any idea of secretly obtaining plutonium through seemingly-clever obfuscations and modifications in Israel's Atoms For Peace program. In a revealing passage, De Shalit writes:

"We should forget about submitting a plan which does not indicate the real purposes. Practically all the people with whom we talked were fully aware of the problem of plutonium, and it is evident that the issue cannot be snuck in through talk about fissile products, power plants, etc. I do not think that there is anyone among the responsible individuals in the United States who would believe that such a state which was in possession of a large scale plutonium separation capacity... would not exploit its knowledge for military purposes, or at least conduct experiments in that direction."³²

This passage sheds a great deal of light on the respective aims and methods of the Israelis and the Americans. De Shalit is clearly aware that Bergmann (and his principal ally, David Ben-Gurion) are pursuing plutonium as a means to acquire a nuclear warhead. Similarly, he is equally

³¹ Cohen, *The Bomb*, 45.

³² Cohen, *The Bomb*, 47.

clear that the United States is quite clearly set against proliferation by erstwhile non-nuclear countries. Finally, his reference to sneaking in plutonium and obfuscating real purposes makes clear the *modus operandi* of the Israeli nuclear program: the usage of covert means to make progress on a nuclear bomb, in spite of American attempts at control. On the whole, de Shalit's takedown of the short-lived proposal to exploit Atoms for Peace deeply foreshadows much of what would follow in Israel's nuclear efforts, and its relationship with America. With the stage set, and the competing Israeli and American motivations outlined, we can now examine the first failure of American attempts to contain the Israeli program: the failure of on-site inspections.

§5. Inspection Failures

Throughout Kennedy's many communications with Ben-Gurion, and later Prime Minister Eshkol after Ben-Gurion's resignation, the demand for inspections was a near-constant. It was the center of Kennedy's hopes to establish certainty that the Israelis were not proliferating, backed by attempts to gather intelligence and to threaten the Israelis into complying. However, nuclear weapons and technology inspections were a wholly new field of work, invented from scratch less than a decade prior. The IAEA was not even a decade old, and the problem of obtaining access so as to inspect sites in foreign countries in order to find specific signs of certain technologies bore few similarities to past problems of international relations. As such, the inexperience of the American government with inspections led them to have little preparation for their inspectors, to be out-manuevered by the Israeli attempts to evade scrutiny, to hold little idea of whether inspections truly worked, and to mis-analyze the results of inspections even once they had been granted.

Perhaps one of the most important reasons that the scientists who inspected Dimona failed to recognize any tell-tale signs of a military nuclear program is that the scientists do not appear in any real sense to have been trained or given clear instruction on how to recognize evidence of a nuclear program. The instructions given to the first inspectors of Dimona, two AEC (Atomic Energy Commission) scientists named Staebler and Croach, Jr., were clearly relatively sparse. Documents detailing said instructions seemed to suggest that the scientists rely on their “general impressions” of the facility to draw conclusions about its expected size, usage, and so on.³³ Surprisingly, the CIA station chief in Tel Aviv was directly and specifically instructed not to make contact with any of the AEC inspection teams, nor to give them any instructions or advising on how best to conduct inspections in search of signs of proliferation violations.³⁴ Unsurprisingly, the summary produced by Staebler and Croach Jr. reflected their lack of advising. Very little space in the report is dedicated to describing the potential significance of their observations, as either indicative of research or production intent. Far more space is dedicated to describing information as one might expect from a report on the progress of a civilian reactor: the report often reiterates without comment what the Israeli scientists had told them about the project, and a significant portion of the report outlines various civilian research projects they aim to undertake going forwards.³⁵ The summary does not just fail to identify disguised or obfuscated elements of the complex at Dimona; no discussion is given of the

³³ "Director of the Office of Near Eastern Affairs Robert C. Strong to Armin H. Meyer, 'Suggested Points to be Made to U.S. Scientists, Dr. Staebler and Dr. Croach, at the Meeting at 2:30 p.m., May 15'." 15 May 1961. From the Wilson Center, *History and Public Policy Program Digital Archive*, RG 59, Israel 1964-1966, box 8, Israel Atomic Energy Program 1961. Obtained by William Burr. <http://digitalarchive.wilsoncenter.org/document/123832>

³⁴ Cohen, *the Bomb*, 175-194.

³⁵ "Atomic Energy Commission AEC 928/1, 'Visit to Israel by U.M. Staebler and J.W. Croach, Jr.'." 7 June 1961. From the Wilson Center, *History and Public Policy Program Digital Archive*. Declassification release by DOE. Obtained by William Burr. <http://digitalarchive.wilsoncenter.org/document/123837>

possibility of such evasion. The summary appears to detail an almost entirely uncritical look at the actual physical space of the facility and its contents.

The lack of preparation for the inspectors was likely compounded by the Israelis' successful attempts to deceive the inspectors. In 1962, Director Yuval Ne'eman of Israel's Atoms For Peace research reactor at Soreq executed a plan to relieve political pressure on the Israelis by staging an "impromptu" visit to the Dimona facility with the AEC scientists who were inspecting the Soreq reactor.³⁶ Towards the end of the visit by the two scientists, Director Ne'eman planned to have them visit and tour the Dead Sea on a sightseeing trip. As it happens, the Dead Sea is relatively close to Dimona, and on the return trip, he "spontaneously" suggested that they make a supposedly-unplanned visit to the reactor in question. Ne'eman had the chief engineer give the AEC scientists a 40-minute tour, during which the Israelis had planned to convince the scientists that the reactor was entirely peaceful, all while limiting the inspection to be significantly more informal than the US had been requesting. They were not shown into all buildings they saw, but the AEC scientists came away from the tour satisfied with the Israeli explanation that it was indeed a research reactor, and that the initial secrecy had merely been a poorly-thought out attempt to prevent overreaction from Israel's neighbors. Over the next seven years, some six inspections proceeded in Dimona, with other similar or related evasion and obfuscation efforts being undertaken by the Israelis during the inspections. For example, no inspectors ever became aware that there was an underground portion of the facility, a deception made possible by entirely bricking up the entrances to the elevators in advance of inspections.³⁷

³⁶ Avner Cohen and William Burr, "How the Israelis Hoodwinked JFK on Going Nuclear," *Foreign Policy Magazine*, 26 April 2016. <http://foreignpolicy.com/2016/04/26/how-the-israelis-hoodwinked-jfk-on-going-nuclear-dimona-atoms-for-peace/>

³⁷ Warner D. Farr, "The Third Temple's Holy of Holies: Israel's Nuclear Weapons," USAF Counterproliferation Center, September 1999. <https://fas.org/nuke/guide/israel/nuke/farr.htm>

As a result, none of the inspections realized that Dimona was a plutonium production facility – specifically, that a nearby building apparently disguised as a “laundry” was the main reprocessing facility³⁸ – over the course of the next decade.

Furthermore, the American government was so comparatively unfamiliar with the process of arms control inspections that it had little idea of whether inspections of such facilities actually worked, at the time. The government commissioned a program, code-named Cloud Gap,³⁹ to determine whether such inspections could verify compliance – in 1963, almost three years after the first discovery of Israel’s classified reactor at Dimona. The program, run out of a small office near the White House, sent inspectors to American military bases to play a high-stakes game of nuclear hide-and-seek. Inspectors would be tasked with looking for telltale signs of the evidence of proliferation hidden by a red team, representing a proliferator state. The program had far more skeptics than it did successes, with a major report suggesting that inspectors were not prepared to tell the difference between real materials and decoys, amongst other failings.⁴⁰ Cloud Gap was later cancelled in 1967, before any final conclusions could be made on the effectiveness of inspections. In any case, the less-than-encouraging results of Cloud Gap suggest that the American inspectors would be distinctly unprepared to make use of the much-demanded inspections, even once they were obtained. Moreover, the mere fact that the program was commissioned, and commissioned years after the initial inspection of Dimona, suggests that the work of arms control inspections was quite early in its infancy during the early

³⁸ Cohen, *The Bomb*, 175-194.

³⁹ Sharon Weinberger, “What a Secret Cold War Game of Nuclear Hide and Seek Teaches Us About North Korean Verification,” *Foreign Policy Magazine*, 8 June 2018. <http://foreignpolicy.com/2018/06/10/what-a-secret-cold-war-game-nuclear-hide-and-seek-north-korean-verification/>

⁴⁰ W. B. McCool and the Atomic Energy Commission. “Project Cloud Gap and CG-34, Demonstrated Destruction of Nuclear Weapons.” *US Department of Energy Archives*. Collection Secretariat, Box 7710, Folder 6 IA II Disarmament. From the Federation of American Scientists, *The Nuclear Information Project*. Updated 26 February 2018. <https://fas.org/nuke/guide/usa/cloudgap/aec-staff041267.pdf>

1960's. American inspectors were simply not prepared for the task of determining whether the Israeli nuclear program was headed towards the creation of a nuclear weapon.

Yet the failures of inspections to obtain conclusive evidence of the Israeli drive towards large-scale plutonium production at Dimona likely went beyond the failure of the inspectors on the ground. American analysts may have been unprepared to identify signs of a nuclear program, and in particular, a plutonium production capacity. Two notable cases raise red flags about the analytical work of the American intelligence community with regards to early proliferation efforts. First, the Americans had performed flyovers of the Dimona facility as early as 1958, and taken aerial photos of the facilities, despite Israeli protestations.⁴¹ However, these photographs apparently were brushed off, not circulated, or otherwise failed to be analyzed properly once taken. While the CIA contended they had known little to nothing of the program during the internal review of how the intelligence community missed the program, the Agency almost certainly failed to analyze the material it already had.⁴²

One possible reason is that the Americans let their preexisting conclusions shape their interpretation of the intelligence, rather than the other way around. The Americans were deeply skeptical that the Israelis could pursue a nuclear weapon; Israel was not a rich, powerful country, and it did not have a meaningful base of nuclear scientists at the outset. In fact, the few early Israeli nuclear scientists made such an argument at the outset of the program in the early 1950's, contending that pursuing nuclear weaponry was an extremely improbable and out of reach moonshot.⁴³ The Americans likely developed the reasonable presumption that it would be nearly unthinkable for a country like Israel to pursue a nuclear weapon, and then suppressed

⁴¹ Farr, *The Third Temple*, 6.

⁴² Gerlini, *Waiting for Dimona*, 147.

⁴³ Cohen, *The Bomb*, 35-36.

information to the contrary of their reasonable presumption when David Ben-Gurion went ahead and pursued a nuclear program regardless. The retrospective Special National Intelligence Estimate 100-8-60 corroborates this possibility, stating that the intelligence community had “the general feeling that Israel could not achieve this capability without outside aid,” leading the Americans to discount anything that looked like the Israelis pursuing such a program on their own.

Second, American intelligence did not come to the conclusion that there was a strong likelihood that Dimona was outfitted to reprocess and produce plutonium based on photos taken of the facility. This conclusion is notable, because the Canadians *did* accurately conclude that the facility was oriented towards plutonium reprocessing, based on analysis of said photos,⁴⁴ when the Americans eventually shared the intelligence gathered from the 1963 Dimona inspection with the Canadians, after withholding it for nearly a year after it was obtained. Even more strikingly, the British and the Canadians decided not to pass on the report arguing that Dimona was such a military nuclear program to the Americans, despite a high degree of faith in the accuracy of the report.⁴⁵ Practically speaking, American intelligence consistently failed to successfully utilize the material obtained by inspections of the facility at Dimona to identify a burgeoning nuclear program across multiple years. It is not likely that American intelligence was prepared to recognize telltale signs of a nuclear program with a high degree of confidence, while other

⁴⁴ J. Koop. "Possible Israeli Nuclear Military Program." Department of National Defence, Canada, Defence Research Board, Directorate of Scientific Intelligence. DSI Report 1/64, March 1964, Secret, enclosed with letter from A.R.H. Kellas to Allan Goodison, 8 October 1964, Secret. From George Washington University's National Security Archive, *The Nuke Vault: The Israel-Argentina Yellowcake Connection*. Posted 25 June 2013. (Accessed 17 May 2018). <https://nsarchive2.gwu.edu/nukevault/ebb432/docs/doc%20wm%202%203-64%20canada%20report%20pages%2049-59.pdf>

⁴⁵ R. C. Treweeks. "Letter from R.C. Treweeks, Defense Intelligence Staff, to Allen Goodison, 8 December 1964, Secret." British National Archives, FO 371/175844. From George Washington University's National Security Archive, *The Nuke Vault: The Israel-Argentina Yellowcake Connection*. Posted 25 June 2013. (Accessed 17 May 2018). <https://nsarchive2.gwu.edu/nukevault/ebb432/docs/doc%20wm%203%2012-8-64%20def%20intell%20report%20on%20Canada%20report%20pp.%2060-62.pdf>

intelligence services were apparently capable of doing so. Why there was such a difference is unclear, although such a difference was undoubtedly present. Perhaps other programs had different perspectives on the potential of different state actors. The British were quickly adapting to no longer being a great power in the wake of the Suez crisis; despite Canada not at all being a great power, it was undoubtedly a paranuclear state at the time, dubbed with Japan as a state “a screwdriver’s turn away” from having a nuclear bomb.⁴⁶

Overall, the prevailing historical evidence paints a picture of American efforts at arms control through inspections, in particular in Israel, as largely a matter of grasping for an unknown object in a dark, unfamiliar room. The American know-how needed to perform effective inspections and detect proliferation very likely did not exist in any real sense by Kennedy’s term. Therefore, President Kennedy’s earnest and genuinely stern insistence on a strong inspections regime is at least somewhat surprising. Most likely, Kennedy and his administration had a misplaced sense of faith in the ability of scientists to detect secret proliferation efforts without further training, and to keep the Israelis accountable through the act of inspecting alone. It is also plausible that he hoped to kill two birds with one stone: both Israeli nuclear ambitions, as well as Arab paranoia. When Egypt’s President Nasser made declarations that the development of an Israeli nuclear program could prompt a pan-Arab preventative war, Kennedy was rightly interested in preventing such a massive regional conflict.⁴⁷

§6. Intelligence Deployment

⁴⁶ Carey Sublette, “Nuclear Weapons Frequently Asked Questions,” *Nuclear Weapons Archive*, section 7.5. <http://nuclearweaponarchive.org/Nwfaq/Nfaq7-5.html>

⁴⁷ Cohen, *The Bomb*, p. 244

The failure of American intelligence to detect and gather accurate information about the nuclear program at Dimona occurred as many – or even most – intelligence failures do: as a result of an under-commitment of resources from the intelligence community towards the multiple critical sites of the problem, alongside structural failures of intelligence sharing. American intelligence collection efforts were minimal in Israel before 1960, with relatively little money, personnel, and technology allocated in Israel, and efforts did not increase following the discovery of the Dimona facility (despite Kennedy’s demands to do so). The collection efforts were also not oriented towards observing nuclear programs in allied and neutral states, as would be necessary to maintain strong export controls. Finally, agency-level territorialism about sharing their intelligence prevented vital intel from being shared across agencies, both within America and amongst the NATO allies.

Fundamentally, the resources of the intelligence community are limited. During the Cold War, most spies were committed towards anti-Soviet intelligence efforts in Europe and Asia, as was to be expected. As such, intelligence efforts oriented towards detecting proliferation in non-adversarial states was not afforded a top-level priority. Or, in the words of the post-mortem on Special National Intelligence Estimate 100-8-60, the 1961 document which sought to diagnose why the intelligence community failed to detect the program earlier: “The second priority status of Israel tended to reduce the effort and urgency attributed to this problem.”⁴⁸ The Israeli nuclear program and its evasions benefited from the oldest intelligence failure in the book: no one bothered to seriously look for it. At the time, American intelligence capacity in Israel was

⁴⁸ U.S. Joint Atomic Energy Intelligence Committee. "Post-Mortem on SNIE 100-8-60: Implications of the Acquisition by Israel of a Nuclear Weapons Capability." Classified intelligence estimate. Created 31 January 1961, Draft, Secret. From George Washington University’s National Security Archive, *The Nuke Vault: The U.S. Discovery of Israel's Secret Nuclear Project*. Posted 15 April 2015. (Accessed 24 May 2018). <https://nsarchive2.gwu.edu/nukevault/ebb510/docs/doc%2027A.pdf>

oriented towards monitoring and managing Arab-Israeli relations, and preventing any conflagrations between Israel and the Arab states with whom America desperately hoped to maintain good relations.⁴⁹

When the program emerged, both the intelligence community and the executive branch sought to increase intelligence-gathering capacity, and condemned the previous lack of relevant intelligence. However, in the years following the discovery of Dimona, the inertia of intelligence priorities made it exceedingly difficult to redirect resources; Long and Shiffrinson argue that ambiguity from the top of the administration on the best course of action, which itself resulted from a lack of intelligence, helped to enable intelligence resources that might otherwise have examined Israel's nuclear program to focus on other issues involving Israel, or entirely unrelated issues.⁵⁰ The consequences of the on-the-ground failure to collect intelligence across Kennedy's term became clear towards its end: in 1963, a memorandum from the National Security Action Committee at Kennedy's behest admonished the intelligence community to urgently improve intelligence on the program.⁵¹ Not only had American intelligence failed to develop collection capacities in the time since the discovery of the program and the commissioning of the post-mortem on SNIE 100-8-60, but it would also fail to develop it going forwards, despite Kennedy's urgings. The 1964 National Intelligence Estimate on possible proliferation efforts contended that Israel had likely not yet decided to pursue a nuclear weapon, and claimed that its biggest obstacle was the lack of a plutonium reprocessing facility.⁵² Reprocessing is the method

⁴⁹ Long & Shiffrinson, *How Long*, 6.

⁵⁰ Long & Shiffrinson, *How Long*, 2.

⁵¹ McGeorge Bundy, "Memorandum on Kennedy's proposal regarding Middle Eastern nuclear capabilities." National Security Action Committee. 26 March 1963. From *Foreign Relations of the United States, 1961-1963: Near East, 1962-1963*, V. XVIII. <https://www.jewishvirtuallibrary.org/memorandum-on-kennedy-s-proposals-regarding-middle-eastern-nuclear-capabilities-march-1963>

⁵² "National Intelligence Estimate NIE 4-2-64, 'Prospects for a Proliferation of Nuclear Weapons Over the Next Decade'," 21 October 1964. From the Wilson Center, *History and Public Policy Program Digital Archive*. Obtained

by which one separates plutonium from spent U-238 reactor fuel rods, and it is usually the fastest means of obtaining the plutonium needed to construct a nuclear bomb. Without a reprocessing facility, the Israelis would not be able to domestically produce weapons-grade plutonium, and the Americans felt relatively secure in their ability to detect any attempted acquisition of foreign plutonium. Ironically, the Israelis had relentlessly pursued reprocessing capabilities since the outset of their program, and had even tried to sneak such capabilities into their civilian, American-provided Atoms For Peace reactor.⁵³ By the mid-1960s, they undoubtedly had such a reprocessing facility at Dimona.⁵⁴

The failure of intelligence gathering goes well beyond a lack of information-gathering capacity in Israel. More broadly, America's intelligence efforts both within and with allied states appears to have created significant intelligence failures. First and foremost was American unawareness of the depth of French-Israeli cooperation in their nuclear programs. The Israeli nuclear program, in many ways, originated when the French turned to Israel for help with developing a French nuclear bomb in the days following the Suez Canal crisis of 1956. The French had a series of vested interests in collaborating with the Israelis: The Americans had blocked French acquisition of certain technologies and heavy water, that could potentially be obtained through the Israeli Atoms For Peace establishment; a nuclear Israel could serve as a vital counterbalance to Egypt in France's struggle to maintain control over Algeria; the Israeli

from the CIA Mandatory Review Appeal and contributed by William Burr.

<http://digitalarchive.wilsoncenter.org/document/115994>

⁵³ Cohen, *The Bomb*, 47.

⁵⁴ Alan C. Goodison. "Letter from Alan C. Goodison, Eastern Department, Foreign Office, to Arthur R.H. Kellas, British Embassy, Tel Aviv, 29 April 1964, with minutes, Secret and Guard." National Archives (Kew Gardens), *FO 371/175843*, 29 April 1964. From George Washington University's National Security Archive, *The Nuke Vault: The Israel-Argentina Yellowcake Connection*. Posted 25 June 2013. (Accessed 19 May 2018).

<https://nsarchive2.gwu.edu/nukevault/ebb432/docs/doc%20wm%208%204-29-64%20Goodison%20letter%20with%20minutes.pdf>

research teams had rapidly become equally sophisticated, and could serve as insurance of forward progress in the face of any technical issues.⁵⁵

These reasons each helped to make France amenable to collaboration with the Israelis; however, two factors in particular shone above the rest. First, the French were only slightly less afraid of Nasser than the Israelis. During the 1950s, the French were attempting to maintain their tenuous control over colonial Algeria. Nasser's Pan-Arab movement helped to add fuel ideologically to a local insurgency campaign against the French, and further, the French were deeply concerned that Nasser would indirectly or directly intervene in Algeria in a war of liberation. Cooperation with the Israelis to develop a nuclear program could help to contain Nasser on multiple levels.⁵⁶ First, a strong Israel would distract and limit Nasser. He would be less willing to start a war with France, if he needed to focus on containing Israel. Second, if Nasser were to start a war with France, the French needed nuclear weaponry to be assured of victory. Obtaining Israeli cooperation could only serve to expedite the acquisition of nuclear weapons.

Second, the nature of the French government at the time made it effectively possible for the Israelis to directly collaborate with the French defense establishment, and circumvent the French presidency and legislature while doing so. France in the 1950s had an "executive paralyzed by a domineering legislature, which was in turn paralyzed by its own failings," and as a result, "there was widespread freedom of action at various levels of bureaucracy."⁵⁷ In the absence of policy direction from any higher authority, policy was dictated by the bureaucrats and ministries of France. As a result, Shimon Peres was able to personally cultivate relationships

⁵⁵ Farr, *The Third Temple*, 3.

⁵⁶ Cohen, *The Bomb*, 49.

⁵⁷ Cohen, *The Bomb*, 50.

with the French defense and interior ministers, who were uniquely sympathetic to both the socialist nature of the Jewish state, and to the Zionist cause, compared to other French cabinet ministers. In France's dysfunctional government, these personal connections were sufficient to quietly drive policy on a grand scale.⁵⁸ Israel capitalized on this opportunity to its fullest.

Subsequently, the French partnered in constructing the plant and the plutonium-separating facility at Dimona, and partnered in virtually every other aspect of their respective covert programs. When the French successfully tested a nuclear bomb in 1960, a plethora of Israeli scientists were on site, and granted "unrestricted access to French nuclear explosion data."⁵⁹ Covert collaboration ran deep to the point that one expert suggested that the French nuclear test represented the rise of two nuclear powers, rather than one. More concretely, the French supposedly supplied the Israelis with yellowcake uranium and plutonium in return for their collaborative efforts.⁶⁰ Before Charles De Gaulle pulled the plug on the collaborative efforts, mere months after the successful French nuclear tests, the programs were virtually intertwined.

Meanwhile, the Americans failed to both track the progress of the French program despite their nonproliferation efforts, and to learn of the significant Israeli presence in the French program. As briefly mentioned earlier, the Americans had tightened controls on nuclear technology exports when they were made aware of the French nuclear program – which occurred only when the French reached out to the British in 1957 to request assistance and cooperation in

⁵⁸ Cohen, *The Bomb*, 52-53.

⁵⁹ Cohen, *The Bomb*, 82-83.

⁶⁰ Farr, *The Third Temple*, 4.

developing a nuclear weapon of their own.⁶¹ Over the next three years, France would successfully develop a nuclear weapon, and both the Americans and the British would entirely fail to take notice of the significant numbers of Israeli scientists working in the French program, nor the significant numbers of Frenchmen working at Dimona. The Americans and British appear to have had functionally zero intelligence capacity within either project. The SNIE 100-8-60 post-mortem directly acknowledges this, and goes further, noting that collection requirements on the French program and potential Israeli cooperation had been made as early as 1957, yet no such intelligence was actually gathered.⁶²

Even worse, the aforementioned nature of the French bureaucracy suggests that American intelligence may have failed to penetrate a relatively easy target. The French effort to collaborate with the Israelis was, effectively, run out of the French defense bureaucracy. It was not a closely-guarded directive from the highest levels, unlike the Israeli military nuclear program. While extracting intelligence from the French defense ministry would presumably require some skill, it does not appear that the French took many special precautions to avoid detection of their collaboration with Israel. That America's intelligence agencies failed to obtain any human intelligence via this comparatively easy target suggests a truly total absence of intelligence capacities in France's government, and most likely in the governments of other allied countries. Overall, it is evident that the American presence of nonproliferation-oriented intelligence capacities in allied states was minimal at best during the 1950's and 1960's. This in turn paved

⁶¹ "Memorandum of Conversation between John Foster Dulles and Selwyn Lloyd, 'Atomic Energy Items: (1) French Request (2) Test Limitation'." 23 March 1957. From the Wilson Center, *History and Public Policy Program Digital Archive*. National Archives, Record Group 59, Records of the Department of State, Executive Secretariat Conference Files, 1949-72, box 127, CF 861 Bermuda 1957 Memcons. Obtained and contributed by William Burr and included in NPIHP Research Update #2. <http://digitalarchive.wilsoncenter.org/document/110063>

⁶² U.S. Joint Atomic Energy Intelligence Committee, "Post-Mortem on SNIE 100-8-60: Implications of the Acquisition by Israel of a Nuclear Weapons Capability," 31 January 1961, Draft, Secret. From George Washington University's National Security Archive, *The Nuclear Vault: The US Discovery of Israel's Secret Nuclear Project*. Posted 15 April 2015. (accessed 5 May 2018). <https://nsarchive2.gwu.edu/nukevault/ebb510/docs/doc%2027A.pdf>

the way for Israeli-French joint subterfuge efforts to succeed in their efforts to evade restrictions such as export controls.

The consequences of weakened export controls are perhaps greater than meets the modern eye: sanctions, while previously used and threatened in more conventional fields of diplomacy, had not yet become a part of the nonproliferation toolkit, and would not until the mid-1970's.⁶³ Inspections were a questionably useful tactic. Controls on technology, knowledge, and materiel were distinct possible ways to contain a program, or at minimum, prevent it from advancing beyond crude Hiroshima-style “gun-type”⁶⁴ nuclear bombs, should it have enough uranium. However, these controls could only succeed insofar as they were not circumvented and evaded. The lack of an American intelligence presence in civil nuclear programs worldwide and covert military nuclear programs in its erstwhile allies severely undermined these sorts of controls, by allowing evasion efforts to happen without notice.

On the topic of yellowcake, the Israeli purchase of yellowcake uranium from Argentina in 1963 demonstrated a related problem in American intelligence capacities with their allies, when poor intelligence sharing emerged as another major handicap. In 1963, the French imposed restrictions on the export of yellowcake uranium to the Israelis, prompting them to aggressively search for other sources of materiel. On November 3rd, 1963, the Israelis and the Argentinians negotiated a deal to purchase 100 tons of Argentine yellowcake uranium⁶⁵ over a three-year

⁶³ Miller, *Secret Success*, 25.

⁶⁴ While plutonium is needed to make efficient nuclear warheads, one can create a fairly low-yield, comparatively clunky nuclear warhead without plutonium if one has a very large quantity of Uranium-235. The bomb America dropped on Hiroshima was of this style. This type is called a “gun-type” nuclear bomb, as the bomb is detonated by firing a large bullet of U-235 down a tube towards another spike of U-235, where their proximity and impact would cause the two subcritical masses of U-235 to go critical and create the desired massive nuclear blast.

⁶⁵ “Yellowcake uranium” is the term for the yellow powder-like substance that naturally-occurring deposits of uranium is refined into, and is the precursor to fuel rods. It is not composed mainly of U-235, the fissile version uranium, but rather is overwhelmingly composed of a compound primarily containing U-238, the non-fissile naturally-occurring isotope of uranium. Further refining of yellowcake is performed to obtain U-235.

period, an amount vastly exceeding the amount needed to run the Dimona plant,⁶⁶ and which put Israel within 20 months of an implosion-style plutonium-based warhead.⁶⁷ In this case, this attempted evasion was detected soon after, in late April 1964 – but by the Canadians, rather than the Americans or the British.

The intelligence eventually made its way to the CIA by July, but only by way of MI6, after the British intelligence community managed to convince the Canadians to permit them to do so. The Canadian intelligence analysts were deeply reluctant to share the intelligence,⁶⁸ as the Americans had refused to share the results of their 1963 inspection of the Dimona facilities with the Canadians.⁶⁹ Had it not been for the British acting as intermediaries, it is highly unlikely the Americans would have ever received this major piece of intelligence. The failure to share intelligence was compounded by the failure to gain it in the first place: when the Americans were given the Canadian report, they expressed deep skepticism, apparently on the grounds that the Argentines had not reported the sale.⁷⁰ The Argentine Atomic Energy Commission (AAEC) had complied with IAEA regulations before, having sought and received “authorization to export 100 tons of uranium concentrate.” This apparently led the Americans to take the AAEC entirely at their word when they stated that “to date no country has purchased any of this,” without seeking

⁶⁶ “Israeli Purchase of Argentine Uranium.” US Embassy in Argentina airgram A-230 to Department of State, Secret, 2 September 1964. From George Washington University’s National Security Archive, *The Nuke Vault: The Israel-Argentina Yellowcake Connection*. Posted 25 June 2013. (Accessed 17 May 2018). <https://nsarchive2.gwu.edu/nukevault/ebb432/docs/9-2-64%20RG%2059%20SN%2064-66%20BX%201228%20INCO%20URANIUM%20FILES-9.pdf.pdf>

⁶⁷ Goodison, “Letter to Kellas,” 2. <https://nsarchive2.gwu.edu/nukevault/ebb432/docs/doc%20wm%208%204-29-64%20Goodison%20letter%20with%20minutes.pdf>

⁶⁸ William Burr and Avner Cohen, “Israel’s Secret Uranium Buy,” *Foreign Policy Magazine*, 2 July 2013. <http://foreignpolicy.com/2013/07/02/israels-secret-uranium-buy/>

⁶⁹ This previously unshared intelligence is what Canada’s J. Koop would use to make his groundbreaking photographic analysis of the facilities and their potential for plutonium enrichment.

⁷⁰ Alan C. Goodison. “Draft Letter to C. J. Audland, Buenos Aires, Secret.” British National Archives (Kew Gardens), FO 371/175844. 26 August 1964. From George Washington University’s National Security Archive, *The Nuke Vault: The Israel-Argentina Yellowcake Connection*. Posted 25 June 2013. (Accessed 17 May 2018). <https://nsarchive2.gwu.edu/nukevault/ebb432/docs/doc%20wm%2015%208-21-64%20letter%20page%2010.pdf>

secondary confirmation. Multiple months passed before the Americans were able to corroborate the Canadian intelligence,⁷¹ suggesting that the Argentine nuclear program was not on the American intelligence community radar in any real sense. The Americans appear to have been reliant on Argentine self-reporting to be certain of Argentine good behavior, which likely contributed to the American failure to notice a case of Argentine bad behavior, particularly as they did not gain access to independent intelligence collection efforts from allied agencies. As a result of intelligence hoarding, America's own intelligence collection and analysis capabilities were distinctly hampered.

It is difficult to understate both the historical and analytical significance of this failure of nuclear export controls: Israel's attainment of sufficient materiel from outside sources to both construct multiple gun-type bombs and to fuel their plutonium separation facility at Dimona meant that virtually nothing short of the full physical removal of the plant and its radioactive material could have stopped the Israeli program from creating a warhead.⁷² Moreover, Israel's former access to French research and nuclear test data strongly suggests that they had the know-how to do so, leaving nothing but the physical components to develop. As such, any effective effort to stop the Israeli program through the restriction of materials would have required an intelligence framework to match it. No such framework appears to have existed, especially as the Americans had little luck finding any further information about the sale, its timing, or the

⁷¹ D. Arkell. "Draft Letter to Alan C. Goodison, Eastern Department, Foreign Office, Secret." British National Archives (Kew Gardens), *FO 371/175844*. 6 October 1964. From George Washington University's National Security Archive, *The Nuke Vault: The Israel-Argentina Yellowcake Connection*. Posted 25 June 2013. (Accessed 17 May 2018). <https://nsarchive2.gwu.edu/nukevault/ebb432/docs/doc%20wm%2019%2010-6-64%20def%20intell%20letter.pdf>

⁷² Some argue that the Soviets tried to do just that, and may have sought to use the Six-Day War as cover for attacking the facility at Dimona. The surprise destruction of the Egyptian air force at the opening of the war dashed any such hopes. For more detail, see Ginor and Remez's *Foxbats Over Dimona* (2008).

location of the nuclear material.⁷³ Eventually, the American government resorted to asking the Israelis about its location, who unsurprisingly, did not provide a forthright answer.

This sort of failure to communicate across intelligence agencies and with other government groups was, unfortunately, nothing new. Nor would it be resolved any time soon. The systematic failures that led to 9/11 identified in Zegart's *Spying Blind* likely were present and damaging in the the 1960's as in 1990's. The post-mortem of SNIE 100-8-60 repeatedly identified breakdowns in interagency communication as a major cause of the failure to identify the emergence of an Israeli nuclear program. In sections 3c, 3d, 9, 11, and 13, the post-mortem specifically identifies interagency communication failures as individual causes of the overall failure to recognize the secret Israeli nuclear program. Causes identified included the failure of the AEC and State Department to communicate information it had on matters like an Israeli purchase of heavy water (an essential ingredient in plutonium manufacturing) with the intelligence community, a strong tendency not to share restricted information pertaining to atomic energy developments with the relevant parts of the intelligence community, and a simple lack of strong procedures for inter-agency dissemination of raw information.⁷⁴

These sorts of failures carry close parallels to the failures that would take place decades later. This indicates that Zegart's diagnosis of intelligence failures in the 1990's may carry analytical weight during Kennedy's administration, or at minimum provides a lens through

⁷³ "Israeli Purchase Argentine Uranium." Department of State cable 1250 to US Embassies in Argentina and Israel. National Archives Record Group 59, Department of State Records Subject-Numeric File, 1964-1966, Inco-Uranium. 11 May 1966. From George Washington University's National Security Archive, *The Nuke Vault: The Israel-Argentina Yellowcake Connection*. Posted 25 June 2013. (Accessed 17 May 2018). <https://nsarchive2.gwu.edu/nukevault/ebb432/docs/5-11-66%20RG%2059%20SN%2064-66%20BX%201228%20INCO%20URANIUM%20FILES-19.pdf>

⁷⁴U.S. Joint Atomic Energy Intelligence Committee, "Post-Mortem on SNIE 100-8-60: Implications of the Acquisition by Israel of a Nuclear Weapons Capability," 31 January 1961, Draft, Secret. From George Washington University's National Security Archive, *The Nuclear Vault: The US Discovery of Israel's Secret Nuclear Project*. Posted 15 April 2015. (accessed 5 May 2018). <https://nsarchive2.gwu.edu/nukevault/ebb510/docs/doc%2027A.pdf>

which to inspect them. Nonproliferation, like counterterrorism, requires an interagency approach. Structural fragmentation in the intelligence community impeded interagency collaboration in the lead-up to 9/11.⁷⁵ Similar barriers likely obstructed intelligence community cooperation with the State Department, as well as with other organizations that otherwise could have matched their export control efforts with the intelligence community's information about attempts to evade the controls (for example, in the aforementioned case of the heavy water sale). It is also entirely likely that interagency information sharing, particularly that of the restricted intelligence mentioned above, was impeded by the culture of secrecy in the CIA which dubbed intelligence sharing to be "unnatural."⁷⁶ Finally, insofar as agents were not incentivized to spend their time sharing intelligence rather than pursuing more career-advancing work,⁷⁷ intelligence sharing likely fell by the wayside as a collective action problem.

As a final aside, intelligence failures also likely share the brunt of the responsibility for full sanctions never being considered as a real option. As sanctions were not used in the Israeli case, this paper makes only a preliminary judgement on the efficacy of sanctions, and will present here a basic examination of the considerations that led to the American presidents choosing to not apply sanctions. While the use or threat of sanctions did not emerge as a tool of nonproliferation policy until 1975 in the cases of South Africa and South Korea,⁷⁸ it had seen use elsewhere, as in Eisenhower's threat of sanctions on Israel during the Suez Canal crisis, amongst others. Public sanctions, however, by their harshly punitive nature, posed a unique set of problems in the case of nonproliferation. Kennedy suspected that Israel's secret facility was

⁷⁵ Amy B. Zegart, *Spying Blind: The CIA, the FBI, and the Origins of 9/11*, (Princeton, Princeton University Press, 2009): 112. ISBN 978-0691141039

⁷⁶ *Ibid.*, 113.

⁷⁷ *Ibid.*, 114.

⁷⁸ Miller, *Secret Success*, 25.

military-oriented, but as noted above, the American intelligence community repeatedly vacillated on whether they believed Israel to be in active pursuit of a nuclear weapon. Kennedy urgently sought further intelligence on the progress of the nuclear program,⁷⁹ but to little avail.

To note, at this earlier stage of the Israeli nuclear program, and prior to their victory in the Six-Day War, Israel was likely significantly more susceptible to American pressure than it was half a decade later, due to the American leverage noted above. Kennedy's many letters, implicit threats, and offers to his Israeli counterpart suggest that he believed as much.⁸⁰ Carson's model of public exposure of nuclear programs⁸¹ would likely predict that, had the Kennedy administration had access to more conclusive information and had strong certainty of the effectiveness of sanctions in forcing compliance, it would have exposed the program and pursued sanctions, in the model of South Korea. However, lacking certainty from intelligence and facing the risk of a major arms race in the case of exposure, there is little evidence that Kennedy ever seriously considered applying harsh sanctions specifically for the sake of stopping Israel's program cold.

There is some reason to believe that Kennedy was right to fear that exposure could set off a broader regional war, although it is equally possible that such an outcome was distinctly unlikely in the earlier stages of the Israeli program during the first half of the 1960s. After the public reveal by the Americans in 1960 that the Israelis were pursuing a secret nuclear program, the reaction by the Arabs was negative, but surprisingly tepid. At the time, the Israeli program was in relative infancy, and both Nasser and the other Arab states surprisingly seemed extremely

⁷⁹McGeorge Bundy, "Memorandum on Kennedy's proposal regarding Middle Eastern nuclear capabilities." National Security Action Committee. 26 March 1963. From *Foreign Relations of the United States, 1961-1963: Near East, 1962-1963*, V. XVIII. <https://www.jewishvirtuallibrary.org/memorandum-on-kennedy-s-proposals-regarding-middle-eastern-nuclear-capabilities-march-1963>

⁸⁰ Ross, *Doomed to Succeed*, 69.

⁸¹ Carson & Carnegie, *Spotlight*, 11.

content to let the Israeli program be collectively forgotten. The topic faded from the Arab headlines rather quickly.⁸² Soon after, Nasser argued in a speech that nuclear-armed nations cannot readily deploy nuclear weapons against non-nuclear nations, citing Britain in the Suez crisis, and contended that the supposed Israeli program may just be a bluff “designed to scare and paralyze the Arabs”;⁸³ this argument would come to characterize Arab rhetoric for years. Meanwhile, Arab diplomats virtually never raised the issue with their American counterparts. From 1960 to 1965, the issue of the Israeli nuclear program was a virtual non-issue in American diplomatic discussions with Arab states.⁸⁴

As the decade wore on, however, Nasser ramped up a series of threats to wage a preventative war if Israel approached the capacity to build a nuclear bomb.⁸⁵ As a result, Johnson’s government attempted to negotiate a trilateral arms control settlement between Egypt, Israel, and America. American diplomats spent much time in 1965 shuttling between Washington and Cairo, attempting to persuade Nasser that his missile program and his support for the Palestinian cause was directly causing an arms race with Israel that he could not win. These efforts did not succeed. Later in 1965, rumors in the press that the Israelis were coming very close to acquiring a missile-delivered nuclear warhead spooked Nasser and his allies.⁸⁶ Cohen maintains that the Seven Days War in 1967 was, in part, an attempt at a preventative war by Nasser. As the 1960s progressed, the consequences of public exposure became substantially more dire.

⁸² Cohen, *The Bomb*, 244.

⁸³ *ibid.*

⁸⁴ “Memorandum of Conversation, Ambassador Mustafa Kamel with President Lyndon B. Johnson,” *National Security Files*, Box 158, Lyndon B. Johnson Library.

⁸⁵ Cohen, *The Bomb*, 252.

⁸⁶ *ibid.*, 255.

So, would sanctions imposed by Kennedy have led to war? It is difficult to make a judgement in either direction with certainty. It is likely that, as Israel's nuclear program became more advanced, the risk of war increased with increasing high-level concern in Arab governments. However, this does suggest that the best time to use these sanctions would have been at the outset of the Kennedy administration, while the Arabs had seemingly dismissed the threat. On the other hand, sanctions could have changed the situation substantially in a number of ways. First, it likely would have made the program much, much more hard for Arab leaders to ignore. If the Americans were to sanction the Israelis, the obvious implication would be that the Americans believe that the Israeli nuclear program was not merely a bluff, but a very real threat. The omnipresence of sanctions would have made deflection and opacity much more difficult, as it is much more difficult to dismiss the threat of a nuclear program once the Americans dub it to be one. Second, sanctions could have inadvertently signalled American approval of an anti-Israeli war. America was far less close to Israel during the 1960s, and indeed, had very recently been much more close to the Arab governments. Eisenhower's previously-mentioned threat to slap sanctions on donations from American Jews to Israel during the Suez Canal Crisis is one of the more clear illustrations of this. As a result, following through on sanctions on an Israeli nuclear program could well have implied to Arab states that America was abandoning Israel altogether, and could have accidentally initiated a regional conflict.

In any case, the lack of American intelligence collection capacities in Israel and Arab states exacerbated this issue. If Kennedy was consistently uncertain about the situation on the ground and the disposition of both Israel and the Arab states, it is no surprise that he did not feel comfortable taking a major, largely unprecedented risk on deeply incomplete information. If the Americans had been more capable in other areas, such as intelligence collection and inspections,

Kennedy may have had the information he required to engage with policy options such as sanctions.

§7. Aftermath

It is extremely difficult to draw direct connections between the events of the Israeli-American game of nuclear cat and mouse and later American nonproliferation campaigns, and there is little available immediate proof that the American intelligence agencies applied lessons from their mistakes in the Israeli case to other cases. Such analysis is also largely beyond the scope of this paper. However, there are some cases and incidents that suggest the American intelligence apparatus did not intend to be fooled twice, where possible. Many of the failures in the Israeli case were directly averted in later nonproliferation efforts, often in ways that directly led to the prevention of a country from obtaining a nuclear capability.

The methods by which America successfully blocked The Republic of China's (hereafter called Taiwan, for simplicity) nuclear program is one case of a clear change in nonproliferation-related intelligence collection efforts. As the unsuccessful Taiwanese program was quite temporally close to Israel's successful program, Taiwan provides a powerful contrast. Taiwan's program emerged only a decade or so after the Israeli program, beginning in the late 1960s. By the 1970s, Taiwan was in a fairly similar position to Israel, as a small state dwarfed by a much larger adjacent rival, and distinctly reliant on a not-entirely-certain American security guarantee. In the Taiwanese case, the adjacent rival (the PRC) was itself nuclear-armed. As a result, Taiwan embarked on a project to develop its own nuclear capability.⁸⁷ This time, however, the United States successfully kept close tabs on the nuclear program. The CIA was accurately apprised of

⁸⁷ Denny Roy, *Taiwan: A Political History*, (Ithaca, Cornell University Press, 2002).

developments within Taiwan's nuclear program, as those developments happened. This enabled America to counter Taiwan's nuclear program in two ways. First, actual certainty about intelligence made the various courses of action much more clear. Instead of having to deal with Kennedy's struggle with deficient intelligence, the options on the table were fully informed for the presidents who dealt with the Taiwanese program. As a result, America was far less gun-shy about applying direct pressure to stop the program. Second, the dedicated CIA intelligence collection effort eventually led to the coup de grace that ended the Taiwanese program. The CIA successfully persuaded Colonel Chang Hsien-yi, the Deputy Director of Taiwan's secret nuclear program, to first work for the agency covertly, and then to defect to America.⁸⁸ Hsien-yi's defection was a devastating blow to the Taiwanese program. Losing the Deputy Director was damaging on its own, but the fact that America's intelligence agencies quickly knew everything there was to know about the program sealed the lid on the Taiwanese program. America was able to respond proportionately and successfully to the Taiwanese program, due to the effective collections efforts of the CIA in the Taiwanese case.

Similarly, nonproliferation tools like inspections became both more effective and more standardized in the decades after these methods failed to stop the Israeli nuclear program. In the wake of the creation of the NPT, systematic global arms control began to enter into force as a basic norm of the international order. In 1993, the IAEA developed the Additional Protocol in addition to their ordinary safeguard measures, as a means of improving inspections capacities. Today, 146 countries have signed Additional Protocol agreements. The decades since the Israeli program has seen the emergence of a norm of consistent, standardized, and effective inspections. The development of the global IAEA nonproliferation inspections regime suggests two possible

⁸⁸ William Ide, "How the US stopped Taiwan's bomb," *Taipei Times* (14 October 1999).

insights with respect to the Israeli program. First, it is quite possible that the lessons of the failed attempt to control the Israeli program helped avoid similar missteps in other countries. Second, even if the modern sophistication of nonproliferation inspections does not derive directly from the American-Israeli case, it certainly contrasts with it. The substantial advancements in inspections and monitoring of today make extremely clear how little nonproliferation experience and know-how the Eisenhower, Kennedy, and Johnson administrations had in their day and age. If we want to know what happened in the nonproliferation efforts of yesteryear, we can look to the difference between what America tried then, and what global institutions like the IAEA does now.

§8. Conclusion

The reasons for the failure of the American superpower to stop the Israeli nuclear program are, without question, many. Circumstantial matters, including the diversion of the Cuban missile crisis, Kennedy's assassination, and the personality and priorities of Kennedy's successor, LBJ, all likely played roles in the eventual outcome of a full Israeli nuclear program. Reasons ranging from divergent priorities to poor intelligence community-policymaker communications have been identified by authors working in the field. On the whole, however, this paper identifies two major points of failure in the implementation of the policies of the Kennedy administration as major reasons why the good-faith efforts that were made to stop the Israeli nuclear program were ineffective. First, inspections suffered from a series of failures, largely stemming from the overall inexperience of actors hoping to enforce non-proliferation norms with the act of performing inspections. Second, multiple structural intelligence failures obstructed efforts to both remain informed about the program and to isolate the Israelis from

external assistance, be it from the French, the Argentinians, or the Norwegians. As a result of these two primary failures, efforts to enact materiel controls and inspections that in other conditions could well have succeeded, failed on the level of implementation.

Historically, Israel's nuclear program was a watershed moment. Israel's cat-and-mouse game with America was the first time the international goal of non-proliferation was challenged by a non-great-power state. While Israel succeeded, in the next two decades, more than half a dozen states pursued nuclear weaponry—and were successfully stopped. Japan and West Germany were prevented from completing nuclear weapons in the 1970's. Taiwan, South Korea, Argentina, Brazil, Iraq, and Libya all were successfully deterred from obtaining nuclear weapons, using a combination of increasingly effective intelligence gathering, public pressure, and private leverage. South Africa and Ukraine fully relinquished their nuclear weapons under international pressure. In contemporary times, an international coalition successfully applied a novel type of sanctions to Iran, and forced it to come to the bargaining table. Each of these methods was first discussed and attempted in regards to Israel, and the lessons of the Israeli program clearly held influence over American policymakers and the intelligence community for years to come. In retrospect, the mistakes and shortcomings of America's approach to Israel became much more clear—and most likely, produced the nonproliferation strategies used, with mixed but notable effectiveness, to this day.

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