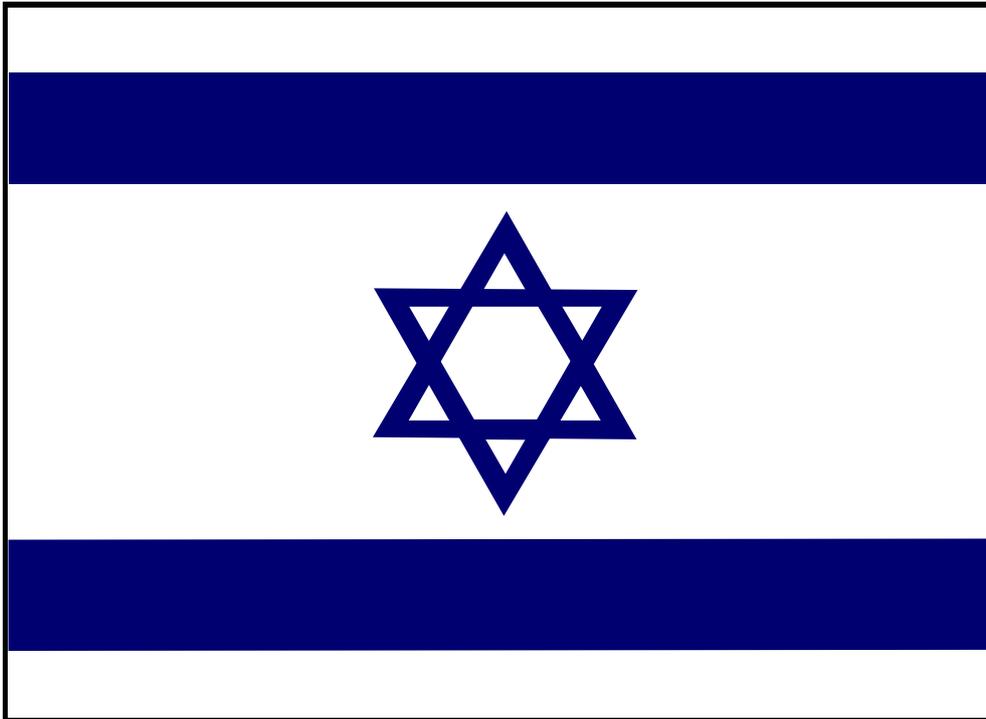


Israel and WMD: Incentives and Capabilities

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Abstract <p>The Middle East is characterised by a comprehensive security deficit, where military power still constitutes the primary tool to protect the regional states. The aftermath of 9/11 has had a profound effect on the Middle Eastern security context and generated an increased focus on weapons of mass destruction (WMD) in the region. This study focuses on Israel, which highly influences the region's attitude towards WMD. However, Israel is often disregarded in Western discussions regarding the impact of WMD on the security dilemmas in the Middle East. The purpose of this report is to evaluate Israel's scientific and technical capabilities to develop WMD, and the state's political intent to utilize this capacity for offensive and/or defensive purposes. The report argues that the Israeli nuclear arsenal is linked to the optimal ability for deterrence and counter-strikes, if the state's existence is threatened. Israel has developed offensive chemical and biological warfare (CBW) capabilities in the past, but it has not been possible to conclude if these offensive programs still remain active. A probable rationale behind Israel's offensive WMD profile is that the ambiguous policy regarding CBW still serves a vital purpose in its strategy of projecting a credible and massive deterrence capability.</p>		
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Sammanfattning <p>Mellanöstern har genomgått av omfattande säkerhetsdilemman där militära medel fortfarande utgör det primära verktyget för att säkra de statliga regimernas maktposition i regionen. Utvecklingen efter terrorattentaten den 9 september 2001 har medfört en rad dramatiska händelser med kopplingar till massförstörelsevapen (MFV) som kraftigt påverkat den säkerhetspolitiska situationen i Mellanöstern och genererat ett ökat fokus på MFV i regionen. Denna studie belyser Israel som tydligt influerat de regionala aktörernas syn på MFV men som ofta exkluderas när strategier för att reducera inverkan av MFV på regionens interstatliga säkerhetspolitiska dilemman diskuteras. Syftet med rapporten är att bedöma Israels tekniska kapacitet att utveckla MFV samt statens politiska ambitioner att utnyttja denna kapacitet för offensiva och/eller defensiva syften. Studien visar att Israels kärnvapen är starkt kopplade till en optimal förmåga till avskräckning och vedergällning vid händelse av att statens säkerhet är hotad. Israel har tidigare utvecklat kemiska och biologiska vapen, men det har inte varit möjligt att fastställa om dessa offensiva program fortfarande existerar. En sannolik drivkraft bakom Israels offensiva profil med avseende på MFV är att Israels traditionella policy av tvetydighet alltså är av stor betydelse för landets grundläggande behov av att projicera en trovärdig och kraftfull avskräckningskapacitet.</p>		
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Summary

The aim of this study is to evaluate Israel's scientific and technical capabilities to develop weapons of mass destruction (WMD), and also the state's political intent to maintain this capacity for offensive and/or defensive purposes.

The assessment is that nuclear capability is central to the Israeli security policy context. Despite this, Israel has never admitted possession of nuclear weapons although considerable and overwhelming evidence exist to the contrary. Israel probably keeps most, if not all, of its nuclear arsenal in an unassembled mode. If a situation was to arise which would require nuclear weapons, fully functional weapons could be completed in a matter of days.

In addition to nuclear capacity, Israel has developed offensive chemical and biological warfare (CBW) capabilities. It has not been possible to conclude if these offensive programs still remain active. However, there is no doubt that Israel has both the scientific know-how, and the industrial infrastructure to produce CBW if so desired. Israel also has a breakout capability to produce CBW in a relatively short timeframe, which could be complemented with chemical weapons (CW) agents produced in the past, if still stockpiled. The most likely present focus of the Israeli chemical and biological program is to develop agents for small-scale covert use, i.e. a so called "dirty tricks" program.

Israeli incentives for embarking on a scientific track to develop WMD were present and strong from the beginning of the states' formation. The most central aspects of these incentives were the combination of being a small country with very limited resources (human and financial) together with the fact that Israel had no close allies in a hostile region where neighbouring Arab states denied it its right to exist.

Israel initiated offensive programs in all fields of WMD with the knowledge that a military significant CBW-capability was the fastest option to reach a military operational unconventional capacity with a strategic impact, while the nuclear track was maturing.

Syria is probably the only actor in the region with a military capable WMD arsenal. Nonetheless, the Syrian capacity is not perceived by Israel as an existential threat that could motivate Tel Aviv to deploy chemical and/or biological weapons, unless the Syrian CW-arsenal is coordinated with other regional states' military capabilities. However, the development of a nuclear program in Iran has made Teheran a new emerging existential threat to the Israeli leadership.

Israel's nuclear capacity, which is fundamentally linked to the optimal ability for deterrence and counterstrikes in case the state's existence is threatened, has contributed to a dead-lock with respect to the Non Proliferation Treaty (NPT). From an outside perspective it is reasonable that an Israeli adherence to the Chemical Weapons Convention (CWC) and the Biological and Toxin Weapons Convention (BTWC), could to a large degree serve Israeli interests in several aspects. However, the most likely rationale behind Israel's continued position to ignore the conventions is that the ambiguous policy with regard to CBW still serves a vital purpose in Israel's overall strategy of projecting a credible and massive deterrence capability. The deterrence policy, which constitutes a cornerstone in Israeli security strategy, seems to be shaped by the

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Israeli defence planners' outlook that they simply can not forsake any means of the ability to, through self-reliance, reassure the state of Israel's future existence.

Map of Israel



1 Introduction

In the aftermath of 9/11, a course of dramatic events linked to WMD has had a profound effect on the Middle East security context. Such events include the continued U.S. military presence in Iraq, the disclosure of Iran's efforts to conceal parts of its nuclear program, the disclosure of a Pakistani nuclear proliferation network with links to the Middle East, the Libyan decision to open its offensive programs for international inspections, new non-proliferation and counter proliferation strategies from the West, (PSI,¹ CSI,² UNSCR 1540³) and an overall increased concern for terrorists acquiring WMD. These events have generated an increased focus on WMD in the Middle East, and on non-democratic states sponsoring terrorism.

In a previous report Syria's incentives and capabilities in regard to WMD were examined.⁴

This study focuses on Israel which as a close ally of the U.S., despite its offensive WMD profile, often is disregarded when the impact of WMD on the security dilemmas in the region are discussed. The purpose of this report is to evaluate Israel's scientific and technical capabilities to develop WMD, and the state's political intent to maintain this capacity for offensive and/or defensive purposes. The intended readers are foremost Swedish governmental officials and professionals within the international disarmament community.

The study is limited to the time period between the establishment of the state of Israel in 1948 and October 2005. It has been conducted using a qualitative method with certain limitations. The information is solely based on open sources, and due to language restrictions no sources written in Hebrew and Arabic have been used, only translated material. It is crucial to keep in mind that since much of the material used is based on Western and Israeli sources, a certain bias has to be expected. Political and scientific aspects have been narrowed down to factors that have been identified as relevant to, and connected with, Israel's procurements of and ability to produce WMD. The scientific area has been covered by identifying the status of the research within chemistry, biology and physics as well as looking at the level of the biotech and chemistry industries. The selection of relevant political factors has been concentrated to official statements, the surrounding security environment, Israel's perception of the increased threat from WMD, international conventions and disarmament, and Israeli strategies and doctrines. Incentives for a large scale military WMD program are unrelated to the fight against terrorism. Thus the Palestinian issue has only briefly been touched upon.

¹ U.S. Department of State, *Proliferation Security Initiative*, URL <<http://www.state.gov/t/np/c10390.htm>>

² U.S. Customs and Border Protection, *Keeping Cargo Safe: Container Security Initiative*, URL <http://www.customs.gov/xp/cgov/border_security/international_activities/csi/>

³ UN Security Council Resolution 1540, 28 April 2004, URL <http://www.un.org/Docs/sc/unsc_resolutions04.html>

⁴ Normark M, Lindblad A, Norqvist A, Sandström B, and Waldenström L, *Syria & WMD; Incentives and Capabilities*, FOI R-1290-SE, 2004.

This report is divided into six chapters organized to provide the reader with an overall context of Israel's security policy, threat perception and WMD capabilities. Chapter 2 serves as a brief introduction to the state of Israel whereas Chapter 3 presents an overview of the past and present security context against which Israel's WMD capabilities have been developed. In Chapter 4 Iran's WMD capacity and its implications on Israeli threat perception is discussed. Chapter 5 looks at Israel's WMD capabilities including its development and current capacity. In Chapter 6 the findings regarding Israel's WMD incentives and capabilities are presented, and future trends regarding Israeli policy development and WMD capabilities are discussed

2 Israel

The state of Israel borders Egypt to the west, Syria and Jordan in the east and Lebanon in the north. Since the 12th century BC until the establishment of the Israeli state, the land was referred to as Palestine. A Hebrew kingdom was established 1000 BC, but was later divided and subsequently invaded by Assyrians, Babylonians, Egyptians, Persians, Romans and Alexander the Great of Macedonia. In 634-640 the Arabs conquered Palestine from the Byzantine Empire, and ruled, only interrupted by Christian crusaders, until the 20th century.⁵ In WW I the British defeated the Turks and gained governance right of Palestine from 1923 to 1945. The British mandate expired after WW II, and the United Nations proposed to partition Palestine into two states, one Arabic and one Jewish, with Jerusalem under UN administration.

When the last British troops had left Palestine, the modern state of Israel (*Medinat Yisra'el*) was established on May 14, 1948. The Arabs opposed the partition, and the next day Arab forces from Jordan, Egypt, Lebanon, Iraq and Syria invaded Israel (the War of Independence). The war ended in January 1949, and Israel had then increased its original territory with 50%.⁶ In 1956 Egypt, Syria and Jordan formed a tripartite military alliance that threatened the existence of Israel, and as a result Israel launched an eight-day campaign in which the Gaza Strip and the entire Sinai Peninsula were seized. During the Six-Day War of 1967 Israel managed to defeat Egypt, Jordan, and Syria by making simultaneous air raids on their air bases. As a result Israel expanded its territory by 200% holding the Golan Heights, the West Bank and the Jordan river, Jerusalem's old city, all of Sinai and the east bank of the Suez Canal.⁷ In 1973 Egypt and Syria attacked Israel (the Yom Kippur War) in an attempt to recapture territory lost in 1967, but no territory was recaptured. However, agreements of disengagement of forces were made with both Egypt and Syria in order to increase Israeli border security. In March 1979 a peace treaty was signed between Israel and Egypt, and the final Israeli withdrawal from the Sinai Peninsula was completed in 1982. In 1981 Israel annexed the Golan Heights, and in 1994 a peace agreement was also reached between Israel and Jordan ending a 46-year state of war. Peace treaties have not been signed with Syria and Lebanon.

⁵ Infoplease, *Israel*, URL <www.infoplease.com/ipa/A0107652.html>

⁶ *ibid.*

⁷ Israel Ministry of Foreign Affairs, *History – The State of Israel*, 3 Feb. 2004, URL <www.mfa.gov.il/MFA/Facts+About+Israel/history/HISTORY--The+State+of+Israel.htm>

3 Past and Present Security Policy Context

The Middle East region has during its history been permeated by a comprehensive security deficit, both within and between states, which has influenced the state actors' priorities within state policy planning. Military might through quantitative and qualitative resources has been, and to a large degree still constitutes to be the primary tool to secure the state regimes in the region.

Israel has been plagued by external threats throughout its history. The sources of security dilemmas have been many, and the scope of the threat has varied from low intensity conflicts to full-scale wars, with an unambiguous risk of escalating into a non-conventional level. The primary ground for Israeli security dilemmas has been its Arab neighbours' objective to disrupt Israel's most fundamental right to exist. This fact has naturally generated Israel's extremely high level of concern for its security interests.

This review of Israel's past and present security policy context does not aspire on covering the broad definition of the term security policy, but rather aims to highlight the aspects of Israel's threat perceptions and strategies that are considered in this study to affect and/or express the state's position with regard to nuclear, biological and chemical weapons. Other aspects of significant Israeli threat perspectives such as terrorism, shrinking Jewish majority and dilemmas concerning natural resources etc. are not covered in this study, or are only briefly touched upon.

3.1 *Declaration of Independence under Existential Threat*

The creation of the Jewish state was dramatic and modest at the same time. Its territory was smaller than Wales, its population hardly exceeded the half-million mark and the country was surrounded by hostile neighbours. The initial monumental and all-pervading task was to secure the survival of the new state, and the tools at hand were minimal. This was the root of the Israeli dilemma and has ever since formed a mighty incentive to gather strength, self-reliance and national cohesion by all available means, including WMD. Hence the directives from the state's first Prime and Defence Minister David Ben Gurion in April 1948 to one of his operatives in Europe to recruit Jewish scientists who could "either increase the capacity to kill masses or to cure masses: both things are important".⁸

The newly formed state's first external objectives were based on four pillars: procurement of military supplies, availability of financial support (not least for the first objective), the movements of immigrants, and the enlistment of international goodwill, where the matter of men and materials were of highest priority in order to deal with the hostile environment represented by the neighbouring Arab states.⁹

3.2 *The Arab States in Israeli Threat Perceptions*

Israeli threat perception has traditionally been divided into two levels. The first level constituted the existential threat that imperilled the very existence of Israel. The sources

⁸ Cohen A, *Israel and the Bomb*, (Columbia University Press: New York, 1998), p. 11.

⁹ Rafael G, *Destination Peace: Three Decades of Israeli Foreign Policy*, (Weidenfeld and Nicolson: London, 1981), p. 11.

of this threat have traditionally been constituted by the Arab states. The second level of threat was termed by the Israeli Defence Force (IDF) as the “current threat” and encompasses challenges to daily life of the Israelis. During Israel’s first four decades the “current threat” referred to border clashes with the armies of the Arab states. Since late 1980s this level is referring to the Palestinian uprising and fundamentalist Islamic groups targeting Israel and Israelis world wide.

Israeli officials have labelled terrorism as a nuisance that will never threaten the state of Israel’s existence.¹⁰ However, a survey of Israeli official statements regarding security threats in media during the last four years shows that terrorism by Islamic fundamentalism and the Palestinian uprising is the main security dilemmas that Israel is facing and, which to a large degree has become dimensional for the Israeli defence planners. Israel has increased its defence expenditures during the years of recession (1996-2003,) mainly as a consequence of the second Intifada, initiated in September 2000. Heavy cutbacks on governmental non-military expenditures made this possible.¹¹

A coalition of Arab armies was regarded as the worst case scenario during Israel’s first three decades, with the 1948 War of Independence highlighting this fact. In mid-1950s the Israeli troops were outnumbered at a rate of twenty-five to one, and the quantity of its military equipment was at a ratio of three to one in favour of the Arab states. In 1955 a massive arms deal between the Soviet Union and Egypt, through Czechoslovakia, contributed heavily to a new dimension of the imbalance between Israel and the Arab states. The sudden inflow of advanced Soviet armaments to Egypt came as a horrifying shock to Israel, whose security margins always had been precarious. At this time the United States continued to abide by its policy of an abstention from arms supplies to the contending parties in the Middle East. It would take until the Kennedy administration before the U.S. decided to supply Israel with weapon systems. In 1956, as Ben Gurion started to prepare the nation for war with Egypt, he instructed the Defence Ministry to track all possible sources for weapon systems and technology urgently needed by Israel.¹²

There has been a 40 % increase in military expenditures in the Middle East region during the last decade, foremost as a consequence of heightened tension in the region over Iraq and the Israeli-Palestinian conflict.¹³ Despite this fact, during the same period there has been a decline of the armed forces amongst the Arab countries with a confrontational stand towards Israel. The Arab armed forces has stagnated, or become weaker for several reasons, including loss of their Soviet patron, lack of financial resources, imposed sanctions etc. One exemption is Egypt, which is the only large military force bordering Israel that is equipped with Western arms, and benefits from Western consulting and training. Egypt is thus regarded as the only Arab entity that is capable of fighting the IDF. There is though a clear objective from the U.S. to preserve Israel’s qualitative edge vis-à-vis Egypt through the refusal to supply high-tech munitions and weapon systems. Egypt’s

¹⁰ Rabin Y (Lt-Gen), ‘After the Gulf War: Israeli defence and its Security Policy’, address at the Begin-Sadat Center for Strategic Studies, Bar-Ilan University, 10 June 1991.

¹¹ Rivlin P, ‘Challenges Facing Middle East Economies’, *The Middle East Strategic Balance 2003-2004*, Jaffee Center for Strategic Studies, (Sussex Academic Press: Brighton, 2004).

¹² Rafael G, *Destination Peace: Three Decades of Israeli Foreign Policy*, (Weidenfeld and Nicolson: London, 1981), pp. 45-46.

¹³ Stockholm International Peace Research Institute, *Military Expenditures*, SIPRI Yearbook 2005, URL <http://web.sipri.org/contents/milap/milex/mex_trends.html>

dependence on the U.S. for both financial and military resources makes a military confrontation with Israel highly unrealistic under present circumstances. If a U.S. hostile regime overthrows Mubarak from power in Egypt a confrontation would become more feasible but would also result in a decline in Egypt's military capabilities.¹⁴

Israel is formally still in a state of war with Syria and Lebanon, but the overall security policy developments in the region with the Madrid Peace Process during the 1990's, and the fall of the Iraqi regime in 2003, have dramatically lessened the prospects of a future armed confrontation with neighbouring Arab states, traditionally referred to by the Israeli leaders as the "second circle of threat"¹⁵. Israel's currently most pressing security dilemma is the long conflict with the Palestinians and militant Islamic fundamentalists, the "inner circle of threat". The term "third circle of threat" is applied to threats from outside the neighbouring states. An emerging existential threat to Israel is posed by the Iranian development of a nuclear industry, with a clear offensive capability and support of terrorism, in connection with a repeated aggressive rhetoric towards the Jewish state (see Chapter 4).¹⁶

3.3 Proliferation of Weapons of Mass Destruction in the Region

The threat from an Arab eastern military front against Israel, most evident in the mid-1970s, has become more distant than ever, particularly after the Israeli-Jordanian peace treaty in 1994, and the fall of the Iraqi regime in 2003. The threat posed by the proliferation of WMD and their means of delivery in the region, increased considerably between the early 1970s and the end of the 1991 Gulf War. Ever since Egypt's use of chemical weapons during the Yemeni civil war in the mid-1960s, Israel has considered WMD as a source of threat. However, it was not until after the 1973 Yom Kippur War that the threat from WMD was upgraded in Israeli defence planning. This was due to the increasing upsurge of missile and WMD technology proliferation in the region at the time.¹⁷ The changed security environment has prompted Israel to enhance its missile defence program, significantly improve its NBC-defence capabilities and maintain a credible massive deterrence posture.

WMD in Israeli threat perception became a fundamental problem and an existential threat from the beginning of the 1980s. In 1981 Israel launched a preventive attack against Iraq's nuclear facility *Osiraq* in order to counter an Iraqi development of a nuclear weapons capability. The nuclear reactor was destroyed by Israeli air force before becoming operational. During the 1980s the extensive use of CW during the Iran-Iraq War contributed to bring the issue of CW proliferation to the forefront on the Middle East security policy agenda. Strong indications of WMD programs in other countries confronting Israel, such as Syria and Libya, were escalating during late 1980s and early 1990s. The WMD threat became critical when the Iraqi dictator Saddam Hussein in April

¹⁴ Brom S, and Shapir Y, 'The Egyptian Armed Forces', *The Middle East Strategic Balance 2003-2004*, Jaffee Center for Strategic Studies, (Sussex Academic Press: Brighton, 2004).

¹⁵ For information regarding Israeli characterization of threats see: Shapir Y, 'Non-Conventional Solutions for Non-Conventional Dilemmas?', *Journal of Strategic Studies*, vol. 24, No. 2 (June 2001), pp.147-175.

¹⁶ De Luce D, 'Iran parades new missiles daubed with threats to wipe Israel off the map', *The Guardian*, 23 September 2003.

¹⁷ Rodman D. 'Defence and Diplomacy in Israel's National Security Experience; Tactics, Partnerships and Motives', (Sussex Academic Press: Brighton, 2005), p. 16.

1990 threatened Israel directly by stating: “We will make the fire eat up half of Israel if it tries to do anything against Iraq”. At the same time Iraq deployed launchers for Scud missiles to the western parts of Iraq, closer to Israel.¹⁸ The escalating conflict with the Iraqi invasion of Kuwait triggered Israel to partially implement a plan for preparations in general hospitals for possible chemical attacks, a plan that was originally initiated by a committee in 1976.¹⁹ In 1999 it was reported that the Israeli army was testing anthrax vaccine on its troops and at the same time assessing possible use on citizens in case of a biological weapons (BW) attack from Iraq.²⁰ A mass vaccination of cattle in 2003 was also performed due to the biological warfare threat during the Iraqi War.²¹

There is no information available that shows any connection between Arab or Muslim states offensive WMD programs and Palestinian organisations or militant Islamic fundamentalists in the region. Neither does any credible information exist that these groups have shown interest in acquiring WMD.

Israel has not signed the 1972 Biological and Toxic Weapons Conventions (BTWC), nor has it ever explained the reasons behind its refusal. In fact, Israel has never issued a public policy statement on BW, and it acts as if it maintains a policy of biological ambiguity. In the beginning of the 1990s the Bush Sr. administration made an effort to get Israel, Syria and Egypt to sign and/or ratify all the relevant WMD treaties existing at that time. Israel showed little interest in the process, and referred to national security when the BTWC was on the agenda.²²

Israel signed the CWC 1993 but has not ratified the convention.²³ Much of the debate within Israel, for or against ratification, has circled around economical disadvantages in standing outside the regime, mainly trade restrictions. Furthermore, Israel has no guarantee at all, that a unilateral ratification would initiate a reciprocal ratification from Egypt, Lebanon and Syria, and instead it could rather leave Israel with less retaliation options.

Israel has attended several meetings organized by the Organization for the Prohibition of Chemical Weapons (OPCW) and the Director General of the organisation met with representatives from the Israeli defence and foreign affairs ministries as late as in March

¹⁸ Quayle D, U.S. Vice President, ‘Key note address at the Soref Symposium 1990’, The Washington Institute for Near East Policy, URL <<http://www.washingtoninstitute.org/templateC07.php?CID=52>>

¹⁹ Adler Y, ‘What if the chemical attacks were real? Reflections on the Medical System’s response to a possible attack’, International Conference on Emergency Civilian Medical Service in a non-conventional War, Tel-Aviv, Israel 8-12 March, 1992.

²⁰ ProMed-mail. *Anthrax vaccination, military – Israel*, URL <http://www.promedmail.org/pls/promed/f?p=2400:1202:13948012234018348843::NO::F2400_P1202_CHECK_DISPLAY,F2400_P1202_PUB_MAIL_ID:X,7146>

²¹ ProMed-mail. *Anthrax, bovine – Israel*. URL <http://www.promedmail.org/pls/promed/f?p=2400:1202:13948012234018348843::NO::F2400_P1202_CHECK_DISPLAY,F2400_P1202_PUB_MAIL_ID:X,26008>

²² Leitenberg M, personal communications, 2005.

²³ Organisation for the Prohibition of Chemical Weapons, *States Not Party*, URL <http://www.opcw.org/html/db/members_sig.html>

2005.²⁴ However, this fact does not necessarily imply that an Israeli ratification is forthcoming in the near future.

3.4 *Israeli Defence Strategies*

The Israeli military capability was foremost focused on an offensive warfare as this mode of warfare always has been considered by Israeli strategists to be the most efficient way of compensating from the state's precarious strategic position regarding terrain, lack of manpower, poor finances, and absence of allies. The Israel view is that a doctrine that strongly emphasizes an offensive capability, rather than a defensive, provides better prospects of deterring the outbreak of war, and should this fail, offers a more liable source to military success (secure Israel's existence) in the event of war.

The Israeli strategy to dissuade the Arab states from initiating a war is based on exploiting the IDF relative superiority in the tactical field and in rapid development of technological platforms. In case deterrence seems to fail, the Israeli defence doctrine put forward pre-emptive strikes in order to neutralize the aggressor's forces and capabilities with the aim to remove the immediate threat.²⁵ Israeli pre-emptive action furthermore constitutes a tool in order to enhance the factor of Israeli deterrence. Deterrence and pre-emptive strikes emanate from Israel's experience during the first two decades of independence. During that period Israel's security-politico trends were heavily determined by strategic and psychological weaknesses, such as the geostrategic limitations, the traumatic experiences of the Holocaust, and the Arab states declaration to destroy Israel.²⁶

The Israeli strategies and security doctrines have been shaped by geographical concerns, such as the lack of strategic depth, heavily centralized infrastructure within reach of Arab armaments, and the state's experiences in both wartime and peacetime. The strategy of acquiring strategic depth (The Six-Day War,) and thereby fairly defensible borders, in combination with a constantly improved deterrence posture, has lessened Israel's propensity to engage in preventive (The 1956 Suez Canal crisis) and pre-emptive strikes (The 1967 Six-Day War).²⁷ Furthermore, the collapse of the Soviet Union and the disarmament of Saddam Hussein's offensive military resources, following the 1991 Gulf War, created a radically altered security policy order in the region, forcing the Arab states to disembark the conventional military option as the overarching path to solve its security dilemmas with Israel.

Geostrategic limitations with a large degree of state infrastructure and population centres within a limited zone between Haifa, Tel Aviv and Jerusalem imply that weapons, elsewhere accounted as tactical or short- to intermediate-range weapons, can have a

²⁴ Organisation for the Prohibition of Chemical Weapons, 'Delegation of Israel Visits the OPCW', Press release #3, 9 March 2005, URL <http://www.opcw.org/html/global/press_releases/2005/PR03_2005.html>

²⁵ Rabin Y (Lt-Gen), 'After the Gulf War: Israeli defence and its Security Policy', address at the Begin-Sadat Center for Strategic Studies, Bar-Ilan University, 10 June 1991.

²⁶ Naveh S (f. Brig-Gen), 'The Cult of Offensive Preemption and Future Challenges for Israeli Operational Thought', Karsh E (ed.), *Between War and Peace*, (Frank Cass: London, 1996).

²⁷ Rodman D, 'Israel's National Security Doctrine: An Introductory Overview', *Middle East Review of International Affairs*, vol. 5, No. 3 (September 2001), p. 6.

strategic impact on Israel.²⁸ Furthermore, the states confronting Israel have superiority in population, natural resources and strategic depth. From this perspective Israel's superior conventional force is not enough to ensure a credible defensive and massive deterrent capability as a long term insurance against worst case scenarios, such as a missile attack launched from a distance.

The impact of proliferation of WMD in the region during the past quarter century, and its effect on the threat perceptions in Israel, have to a large degree positioned the policy of strategic depth to the periphery of the security policy agenda concerning "existential threat" perceptions.²⁹ Thus, the Israeli national security doctrine changed during the 1990s towards a strategy of exchanging territory for formal peace treaties or informal arrangements, including security guarantees, international monitoring, demilitarized zones, early warning stations, etc.

Historically, Israeli deterrence has primarily been focused on the prevention of full scale war with its Arab neighbours. The Israeli deterrent posture in general has been built on the projection of an overpowering strength that will result in an Israeli ability of determination of any wars intensity, scope and thereby its outcome. More specifically, the Israeli deterrence has been constructed around a concept of clearly stated "red lines" that, if crossed, would trigger a firm and decisive military response. In contrast to deterrence posture in regard to conventional conflicts, Israel's WMD deterrence has been less clearly expressed. Although, the existence of Israeli offensive WMD programs have been suspected since the 1960's, Israeli official statements of a non-conventional military capability have not been hinted upon until the late 1980's, an apparent reflection of the growing Israeli concerns of WMD-proliferation by countries like Iraq, Syria and Libya.

The terror events in the U.S. on September 11, 2001, had a significant impact on the Israeli foreign policy strategies in general, and its room for manoeuvre regarding its confrontational neighbouring states in particular. In regards to the perceived non-conventional threat, the 9/11-terror events, the Bush administration's subsequent war on terrorism, and states' sponsoring terrorism, came to address several aspects of the Israeli concerns. The U.S. president's State of the Union Address in January 2002, explicitly singled out two of Israel's prime enemies with reference to their WMD ambitions and support of terrorism.³⁰ The post-9/11 U.S. policy has resulted in the downfall of the Iraqi regime, Libya's adherence to international WMD disarmament treaties, and an increased pressure on Iran to declare its nuclear facilities and activities, with a clear ambition to deny Iran a nuclear fuel cycle capacity. Hence, the international community has to a large degree confronted a large part of the Israeli WMD concerns, which has placed Israel in the back seat, only to observe the development, and occasionally make selected statements with an effort to keep the issue on top of the international agenda.^{31,32}

²⁸ Baumgardt C and Müller H, 'A Nuclear-Weapons Free Zone in the Middle East; A Pie in the Sky?', The Center for Strategic and International Studies and the Massachusetts Institute of Technology, *The Washington Quarterly*, Winter 2004-05, 2004.

²⁹ Rodman D, 'Israel's National Security Doctrine: An Introductory Overview', *Middle East Review of International Affairs*, vol. 5, No. 3 (September 2001).

³⁰ The White House, 'President Delivers State of the Union Address', 29 Jan. 2002
URL<<http://www.whitehouse.gov/news/releases/2002/01/20020129-11.html>>

³¹ Anonymous, 'Sharon: Iran's nuclear weapon program nears 'point of no return'', *CNN*, 13 April 2005.
URL<<http://www.cnn.com/2005/WORLD/meast/04/13/sharon.mideast/>>

The Israeli threat perceptions regarding the Arab states' conventional troops and WMD arsenal have had a strong impact on Israeli defence policy over the decades. With the exemption of the Syrian chemical weapons arsenal,³³ the threats from the Arab WMD in Israeli perceptions have eroded since early 1990's, and have to a large extent disappeared. However, the development in Iran during the same period of time is perceived by Israel to progress in the opposite direction.

³² Anonymous, 'Sharon Concerned Over Renewed Iranian Nuclear Efforts', IsraelNationalNews.Com, 9 Aug. 2005, URL <<http://www.israelnn.com/news.php3?id=87410>>

³³ See Normark M, Lindblad A, Norqvist A, Sandström B, and Waldenström L, *Syria & WMD; Incentives and Capabilities*, FOI R-1290-SE, 2004.

4 Iranian WMD in Israeli Threat Perceptions

Iran is regarded, by foremost the United States and Israel, as the biggest threat in the Middle East. Thus, in 2002, U.S. President Bush proclaimed Iran a member of the “Axis of Evil” together with Iraq and North Korea. The main reasons behind the perception of Iran are primarily its ballistic missile capacity and terrorist sponsoring activities, linked to the development of a nuclear program. Israeli Prime Minister Ariel Sharon has publicly stated, “Right after Iraq must come Iran.”³⁴ While Iran on the one hand has been modernizing its armed forces, especially its missile capabilities, Israel’s military on the other, has elevated the prospect of an operation to destroy Iran’s suspected nuclear program.

Israel is critical of the lack of incentive from the international community towards Iran, and has warned that “Israel would consider unilateral action to stop the ‘nightmare scenario’ of Teheran’s development of nuclear weapons.”³⁵ An expected military action from Israel would most likely be an air strike, like the one used to destroy Iraq’s *Osiraq* reactor in 1981. Thus faced with such a threat, Iran has been forced to upgrade its military defence and deterrence capabilities. According to Israel, “the fact that a country like Iran, an enemy of Israel and which is particularly irresponsible, has equipped itself with non-conventional weapons is worrisome.”³⁶ Tel Aviv also argues:

the combination in this case of a nonconventional regime with nonconventional weapons is a concern, ...and we will not stand by and allow the Iranians to use the same cat-and-mouse games over their nuclear plants that Saddam used over many years.³⁷

The threat is also related to the perception that “Iran poses a greater threat than Iraq has for the past decade and is gaining nuclear expertise more quickly than the U.S. estimates.”³⁸ In the eyes of the Iranian leadership “the appearance of any strategic deterrence would upset Israel’s strategic calculations and might rectify the strategic balance of power in the Middle East.”³⁹

4.1 Israeli Perception of the Iranian Threat

The main threat Iran poses to Israel is the ongoing development of a nuclear program. The Iranian prospect of attaining nuclear weapons has risen over the years and become the primary and greatest threat to Israel’s security, as the head of Mossad Meir Dagan put it in 2003.⁴⁰ In July 1993 Prime Minister Shimon Peres said: “We must clarify to the world the real nature of Rafsanjani’s Iran. [They] regard Israel as a ‘collective Salman

³⁴ Information Clearing House, *Israel and US Prepare to Attack Iran*, 20 Sept. 2003, URL <www.informationclearinghouse.info/article4907.htm>

³⁵ *ibid.*

³⁶ *ibid.*

³⁷ *ibid.*

³⁸ Gaouette N, ‘Israel: Iran is now danger No.1’, *The Christian Science Monitor*, 28 Nov. 2003, URL <www.csmonitor.com/2003/1128/p06s01-wome.htm>

³⁹ Amayreh K, ‘Israel to US: Now for Iran’, *Aljazeera Net*, 29 Aug. 2004, URL <<http://english.aljazeera.net/NR/exeres/03398F16-8119-4A21-83E4-D93E5F161B55.htm>>

⁴⁰ Gilbert N and JPost.com staff, ‘Mossad chief: 40 global terror warnings on Jews, Israelis’, *The Jerusalem Post*, 17 Nov. 2003.

Rushdie' and would like to do to us what they would like to do to him".⁴¹ Another apocalyptic prophesies was expressed by Netanyahu in 1996, who labelled Iran as the most dangerous regime, "which has wed a cruel despotism to a fanatic militancy. If this regime, or its despotic neighbour Iraq, were to acquire nuclear weapons, this could presage catastrophic consequences, not only for my country, not only for the Middle East, but for all mankind".⁴² Two years later, when questioned about the Iranian threat, he warned that "in the event that diplomacy fails to remove the threat, Israel has the means at its disposal to provide other forms of action".⁴³

Israeli transport Minister Ephraim Sneh said in February 2002, that Israel would not attack Iran first, which was a response to Iran's Defence Minister's warning that his country would retaliate "beyond the imagination of any Israeli politician" for a possible Israeli attack on Iran's nuclear reactor.⁴⁴ In a speech to delegates at an international conference in Paris on ballistic missile proliferation, Sneh added that Iran on numerous occasions had threatened to use its missiles against Israel.⁴⁵

In a November 17, 2003 testimony before the Israeli Knesset's Foreign Affairs and Defence Committee, Meir Dagan, stressed that an Iranian atomic capability would constitute "the biggest threat to the existence of Israel since its creation" in 1948. Tehran, according to the intelligence chief, will soon reach a "point of no return" in its nuclear development, after which an Iranian offensive atomic capability would be a virtual certainty.⁴⁶ Dagan's assessment followed a warning by Israeli Defence Minister Shaul Mofaz that "Israel can in no way accept the presence of a nuclear weapon in Iranian hands", a thinly-veiled threat that Israel is prepared, if necessary, to neutralize the Iranian nuclear program by force if current international pressure fails to curb Tehran's nuclear ambitions.⁴⁷ Mofaz shortly afterward stated that "concentrated efforts are needed to delay, to stop or to prevent the Iranian nuclear program".⁴⁸

The Iranian efforts to obtain a nuclear capacity was seen by Tel Aviv as the most serious emerging threat to Israel, and made Ariel Sharon in July 2004 label Iran's exertion "the biggest threat to the existence of Israel" and evoke Begin's 1981 statement when he declared that "Israel will not allow Iran to be equipped with a nuclear weapon".⁴⁹ In

⁴¹ Anonymous, 'It is important to reveal Iran's real face', *Ma'ariv*, 1 July, 1993, quoted in Feldman op. cit. 106.

⁴² Netanyahu B, 'Netanyahu calls on U.S. to preserve Israel's nuclear monopoly', Israeli Prime Minister Benjamin Netanyahu in an address to a joint session of the U.S. Congress, 10 July 1996, Special Report: Arms Control & Proliferation in the Middle East, vol. SR No. 2, November 1996.

⁴³ Schiff Z, 'Who has the right to make threats?', *Ha'aretz*, 4 Feb. 1998.

⁴⁴ In an interview with al-Jazeera, Iranian Defence Minister Shamkhani stated, "It is certain that if Israel carries out any military action against Iran, the response will be beyond the imagination of any Israeli politician", *Middle East Week in Review*, 9 Feb. 2002, vol. 2, issue 2, Center for Middle East Peace and Economic Cooperation.

⁴⁵ Anonymous, 'Iran has produced 20 Shihab missiles, Israeli official says', *World Tribune*, 8 Feb. 2002, URL [World Tribune.com <http://216.26.163.62/2002/me_iran_02_08.html>](http://216.26.163.62/2002/me_iran_02_08.html)

⁴⁶ Gilbert N and JPost.com staff, 'Mossad chief: 40 global terror warnings on Jews, Israelis', *The Jerusalem Post*, 17 Nov. 2003.

⁴⁷ Pedhatzur R, 'The point of no return', *Ha'aretz*, 18 Nov. 2003.

⁴⁸ Anonymous, 'Sharon personally heading Israeli efforts to stop Iran nuclear bomb: radio', *Agence France Presse*, 23 Nov. 2003.

⁴⁹ Mahnaimi U, 'Israel Targets Iran Nuclear Plant', *Sunday Times (London)*, 18 July 2004.

response to the 2004 annual intelligence assessment presented to Knesset, former Deputy Defence Minister Ephraim Sneh (Labour) said, "If the international community's helplessness in the face of the Iranian threat persists, Israel will have to weigh its steps -- and soon." Ehud Yatom (Likud) commented, "The Iranian nuclear facilities must be destroyed, just as we did the Iraqi reactor. We must strive to attain the ability to damage and destroy any nuclear capability that might be directed against Israel." However, it is important to keep in mind that the statements of a few Israeli legislators cannot be considered an official policy statement of the Israeli government.⁵⁰

In August 2004, Iran's Foreign Minister Kamal Kharrazi assured that the Iranian nuclear program was a peaceful enterprise, but that Iran would react if Israel was to strike its facilities. "We have our defence capability and that certainly keeps others from exercising such a threat," he said. "They know what our capability is and how ... we react".⁵¹ Arieh Herzog, director of the Israel Missile Defence Organisation said that Israel faced two kinds of threats in 2004. While the Syrian missile threat "is mainly in the 'Scud' family", the Iranian threat "is longer range, more sophisticated and more threatening because of the types of warheads that they are developing", he said in Washington, DC, prior to an Iranian rocket tests. Israel, through its Arrow System Improvement Program, wants "to be sure that whenever the Iranians have better performance on their side, we will already have our answers," Herzog said.⁵²

In September 2004, the Israeli Prime Minister Ariel Sharon said, "there is no doubt" that Tehran is trying to acquire nuclear weapons and "that is a very big danger, especially since they succeeded in developing a rocket, the Shehab-3 that ... puts Israel in its range".⁵³ Foreign Minister Silvan Shalom stepped up the war of words with Iran during his address to the UN General Assembly, saying "Iran has replaced Saddam Hussein as the world's number one exporter of terror, hate, and instability".⁵⁴ In addition, the Israeli Prime Minister concluded in a speech to American congressmen that Iran, Libya and Syria were irresponsible states, which, he said "must be disarmed of weapons of mass destruction and a successful American move in Iraq as a model will make that easier to achieve".⁵⁵

In an opening speech on Israel's disengagement plan, in October 2004, Ariel Sharon told the Knesset that "Iran is making every effort to arm itself with nuclear weapons, with ballistic means of delivery, and it is preparing an enormous terrorist network with Syria and Lebanon", but added that "we are powerful enough to defend this country and hit our enemy hard".⁵⁶ On January 16, 2005, Foreign Minister Silvan Shalom accused Iran of preparing nuclear weapons that would be able to target "London, Paris and Madrid" by the end of the decade. "We believe the Iranians will never abandon their dreams" of

⁵⁰ Samii B, 'Iran Report', *Radio Free Europe/ Radio Liberty*, vol. 7, No. 29, 31 Aug. 2004. URL <<http://www.rferl.org/reports/iran-report/2004/08/29-310804.asp>>

⁵¹ Anonymous, 'Iran again warns Israel against attacking nuclear facilities', *Associated Press*, 23 Aug. 2004.

⁵² Sirak M, 'Iran, Israel trade barbs over new missile tests', *Jane's Defence Weekly*, 18 Aug. 2004.

⁵³ Anonymous, 'Teheran ready for 2nd Shihab-3 test', *The Jerusalem Post*, 8 Sept. 2004.

⁵⁴ Keinon H, 'Shalom toughens stance on Iran', *The Jerusalem Post*, 24 September, 2004, see also Israel Ministry of Foreign Affairs. 'Address by FM Shalom to 59th UN General Assembly', 23 Sept. 2004.

⁵⁵ Benn A, 'Sharon says US should also disarm Iran, Libya and Syria', *Ha'aretz*, 30 Sept. 2004.

⁵⁶ Reuters, 'Sharon targets Iran on nukes', *The Telegraph of India*, 25 Oct. 2004.

nuclear weapons, Mr Shalom said. "It is not Israel's problem any more; it is the world's problem". He said that "the question is not if Iran will hold a nuclear bomb in 2009, 2010, 2011, it is whether they have that knowledge. In six months, they will finish the tests to have the knowledge to produce weapons of mass destruction".⁵⁷ In September 2004 in an address to the United Nations 59th General Debate of the General Assembly Shalom had made a similar accusation.⁵⁸

On January 27, 2005, Shaul Mofaz spoke of Iran's enrichment of uranium and the threat to the free world, "We know that Iran has a very high desire to achieve the goal of possessing nuclear power. The fact that in Iran there is an extreme regime and that they already have long-range surface to surface missiles, means that having a nuclear power will create a threat to the free world". He urged for sanctions to be imposed against Iran and asked for inspections of all Iran's nuclear sites to be carried out, but also stated that "the goal should be a full stop to the nuclear program...using first the diplomatic channel".⁵⁹ Three days earlier Mossad's Meir Dagan had made the assessment that "by the end of 2005 the Iranians will reach the point of no-return from the technological perspective of creating a uranium-enrichment capability".⁶⁰ In April, a senior Israeli official said that it was "not Israel's job to lead" the effort of preventing the development of an Iranian nuclear capability, but that it could "not be delayed much longer".⁶¹ Many similar statements have previously been made by Israeli officials.⁶² Thus one can delineate that Israel perceives the Iranian threat as critical, primarily referring to its suspected nuclear development.

4.2 Iran and WMD

In order to comprehend how Israel perceives the threat from Iran, it is crucial to define Iran's view of the strategic importance of WMD. The status of Iran's WMD capabilities will not be discussed in detail, but in short it can be stated that the interest in chemical weapons (CW) began during the Iran-Iraq War when Iraq repeatedly used CW against Iran.⁶³ At the end of the 1980s an effective production of CW was in place and also

⁵⁷ MacAskill E and Campbell D, 'Iran and Syria confront US with defence pact', *The Guardian*, 17 Feb. 2005.

⁵⁸ Shalom S, Foreign Minister, 'Address by Silvan Shalom, to the United Nations 59th General Debate of the General Assembly', 23 Sept. 2004, URL <<http://www.un.org/webcast/ga/59/statements/isreng040923.pdf>>

⁵⁹ Johnson E, 'Israel's defense minister warns Iran's nuclear program close to point of no return', *Associated Press*, 27 Jan. 2005.

⁶⁰ Reuters, 'Iran says Israel nuclear accusations are baseless', *Yahoo India News*, 26 Jan. 2005, URL <<http://in.news.yahoo.com/050126/137/2j8k3.html>>

⁶¹ Sanger DE, 'Sharon asks U.S. to pressure Iran on nuclear arms', *The New York Times*, 13 April 2005.

⁶² Like Shimon Peres' statement on 25 January 2005: "Iran is the problem of the Middle East," Peres said. "It is a group of people who have freed themselves from speaking the truth, who think that the means justify the ends, and who hide everything they do. It is the center of terrorism in the Middle East. It is trying to create a nuclear option with a religious coloration. The Iran issue is a global one. Let the world conduct the war. How much do we need to take upon ourselves", 'Dagan: Egypt, Syria have nuclear programs, as well as Iran', *Ha'aretz*, 25 Jan. 2005.

⁶³ Nuclear Threat Initiative, *Chemical Overview*, URL <www.nti.org/e_research/profiles/Iran/Chemical/print/index.prt>, *Chemical Capabilities* URL <www.nti.org/e_research/profiles/Iran/Chemical/print/23334.prt>

advanced research on biological weapons (BW).⁶⁴ Iran joined the CWC in 1997 and acknowledged past development and production of chemical weapons. However, according to Iran the CW program was dismantled after the end of the war, but U.S. intelligence believes that the program is still intact and that Iran has stockpiles of CW, and “continues to seek chemicals, production technology, training, and expertise from abroad.”⁶⁵ Regarding to BW capabilities Iran is a member of the BTWC, and has the technological capacity to maintain an offensive program. In the field of nuclear weapons (NW), which at present is the main concern regarding Iran, one can delineate that Iranian interest in nuclear technology started during the regime of the Shah, and the first research reactor was purchased from the U.S. in 1967. After the 1979 revolution, the nuclear ambitions decreased, but were revived in the 1990s. At present Iran has a number of nuclear power sites that are under IAEA control, but there are also reports of several non-declared nuclear sites.⁶⁶

The Iran-Iraq War and Iraq’s invasion of Kuwait provided Iran with information regarding “practical instruction on the kinds of military power, their deployment and use, and about military organization and the use of force.”⁶⁷ The lack of response from the international community to the extensive use of CW during the Iran-Iraq War could also have had an impact on continued CW production. This has guided Iran in the reconstruction of its military and influenced how and in what context its military will function. The reason for Iran’s military build-up is based on its intent to live up to its geographically and ideologically unwavering role as a dominant power in the Persian Gulf and justified as follows:

As the smaller countries around us have armed themselves to the teeth and buy most modern material [i.e. Israel], we too – as a big and vast country, which has been the target of many threats throughout history, and especially during the decade of the Islamic revolution – will do the same...⁶⁸

Until the 1980s, Iran’s indigenous capabilities to manufacture advanced conventional weapons and WMD were scarce. The last decade has been concentrated on obtaining skills and technology to become self-sufficient. The objective has been reached in some areas, especially concerning CW and ballistic missiles, but Iran still remains dependent on foreign assistance. Due to U.S. sanctions and trade embargos, Iran’s main suppliers have been concentrated to Russia, China and North Korea, which all supply Teheran with critical technology. The international community views especially the North Korean supply of missiles and missile technology to Iran, but also to other states in the Middle East, as a great threat to regional stability.

⁶⁴ For information regarding Iran’s biological capabilities, see Westerdahl K. *et.al* ‘Iran’s Disarmament and Arms Control Policies for Biological and Chemical Weapons, and Biological Capabilities’. (FOI: Umeå, 2003) pp. 37-88

⁶⁵ Rademaker S, *United States of America National Statement to the First Review Conference of the Chemical Weapons Convention*, 28 April 2003, URL www.cwc.gov/Industry_Outreach/speeches_and_pressreleases/Rademakers_speech

⁶⁶ For details, see Chapter 13 ‘Iran’ in Andersson P *et al.* *Kärnvapen i världen 2004*. (FOI: Stockholm, 2004) FOI-R-1357-SE pp. 63-65.

⁶⁷ Chubin S, *Iran’s national security policy: intentions, capabilities and impact*, (Washington: The Carnegie Endowment for International Peace, 1994) p. 19.

⁶⁸ *ibid.* p. 49

Iran's main nuclear aspirations derive from the urge to create a deterrent towards the threats that have evolved in the region since the end of the Cold War. Prior to the fall of Saddam Hussein, Iraq and the U.S. were the main dilemmas for Iran's national security concerns, and dominated Teheran's "perceptions and determined its defence priorities."⁶⁹ After the removal of Saddam Hussein, the U.S. has emerged as Iran's main strategic concern, and Washington's current policy has made it Teheran's main driver for strengthening its deterrence policy. The main reason for this is the Bush administration's "pledges [of] the pre-emptive use of force as a tool of counter proliferation, combined with the substantial augmentation of American military power on Iran's periphery."⁷⁰ This has led to a feeling of encirclement by U.S. power and after the U.S. proclamation of the Axis of Evil, it has raised fears in Iran of being Washington's next target, thus the need of heightened national security and deterrence have increased rapidly.

On September 22, 2003, Iran's president Khatami said that "Iran is against the proliferation of WMD, but stressed that the Islamic Republic will persist on its legitimate right to become strong based on science, technology and a capable economy."⁷¹ He also stated that "today our region has become the centre of aggression, terrorism and storing weapons of mass destruction and the centre of all these is the Zionist regime."⁷² As a response to the ongoing nuclear dispute with the United States, Khatami claimed; "Israel possesses the largest arsenal [of WMD]...Israel, which is not respecting any international law, enjoys the support of certain states, but many powers want to put pressure on the Islamic Iran as a result of Israel's provocations."⁷³

The newly inaugurated president, Mahmoud Ahmadinejad has embarked on a more confrontational policy in comparison to his predecessor, in regards to Iran's dialogue with the international community concerning the nuclear dilemma. This became evident on October 26, 2005 when Ahmadinejad, during the Iranian one-month protest against Israel named "World without Zionism," restated a remark from the former Ayatollah to wipe out the state of Israel. Ahmadinejad said that "the new wave of confrontations generated in Palestine and the growing turmoil in the Islamic world would in no time wipe Israel away."⁷⁴ He also added that "And God willing, with the force of God behind it, we shall soon experience a world without the United States and Zionism."⁷⁵ The Israel Ambassador to the UN responded by stating that "Iran has emerged not only as a threat to Israel but as a 'global threat.'"⁷⁶ In retort to the global condemnation that followed Ahmadinejad hostile remarks towards Israel, he claimed "they [the international community] are free to say but their words lack any credit."⁷⁷ Furthermore, the Iranian

⁶⁹ Takeyh R, 'Iran's Nuclear Calculations', *World Policy Journal*, Summer 2003. p. 22

⁷⁰ *ibid.* pp. 22-23.

⁷¹ IRNA, 'Khatami: Iran against WMD proliferation', 22 Sept 2003, URL <<http://www.globalsecurity.org/wmd/library/news/iran/2003/iran-030922-irna01.htm>>

⁷² *ibid.*

⁷³ *ibid.*

⁷⁴ CNN, 'Iranian leader: Wipe out Israel', 27 Oct. 2005, URL <<http://www.cnn.com/2005/WORLD/meast/10/26/ahmadinejad/index.html>>

⁷⁵ *ibid.*

⁷⁶ CNN, 'Iran denies Israel attack threat: UN condemns remarks on Israel by Iran's president', 29 Oct. 2005. URL <<http://www.cnn.com/2005/WORLD/meast/10/29/iran.remarks/index.html>>

⁷⁷ *ibid.*

President has appointed a set of cabinet ministers with a clear conservative profile which are likely to support this policy trend.⁷⁸

It has to be concluded that the Israeli threat perception regarding Iran has to be concentrated on nuclear development, the existing possession of missiles and fierce rhetoric rather than on the threat posed from Tehran's biological and chemical weapons capabilities. Especially the rhetoric seen in numerous statements, during the past ten years, between Tel Aviv and Teheran have been focused, on the one hand, Israel's fear of a nuclear Iran, which could threaten the existence of Israel, and on the other, Iran's need for deterrence against Israeli nuclear capacity and post 9/11 U.S. policy. Nevertheless, Iran as Israel, feel threatened by respective WMD capabilities, and on both sides the threat perception has to be perceived as justifiable.

⁷⁸ Fathi N, 'Iran's President Faces Tough Questioning over Cabinet Picks', *New York Times*, 21 Aug. 2005.

5 Israeli WMD Capabilities

5.1 Introduction

There exists almost universal consensus among analysts that Israel has the largest nuclear weapons arsenal outside of the five states declared as nuclear weapon states in the NPT. Some apparently well-informed sources also claim that Israel has developed an offensive BC-capacity.^{79,80} Moreover, Israel together with North Korea, have the worst record in the world when it comes to signing and ratifying multilateral WMD treaties. Israel acceded to the 1925 Geneva Protocol in 1969, is a non-signatory state to the BTWC, and has signed, but not ratified, the CWC. Israel is one of only four states outside of the NPT and has signed, but not ratified the Comprehensive Test Ban Treaty (CTBT).

When discussing a country's biological and chemical weapons programs it should be stressed that the two conventions banning this type of weapons entered into force in 1975 (BTWC) and in 1997 (CWC), respectively. Development of BW and CW capacity before this time does not breach any international treaties. The 1925 Geneva Protocol does ban "the use in war of asphyxiating, poisonous or other gases" and "the use of bacteriological methods of warfare" but has no implications in the research, production, stockpiling or destruction of such weapons or agents. It should be observed that Israel as a non-member of both BTWC and CWC does not breach these treaties by stockpiling B or C agents.

Since the formation of the state of Israel, science and technology have been the driving forces behind the development towards a modern and prosperous nation. David Ben Gurion insisted that Israel's security should be based on science and technology. Those were the only areas where the new state had a significant advantage over its more numerous Arab enemies.⁸¹ Also, one must remember that Israel was created in the shadow of the Holocaust, which meant that many considered Israel to have the right to use every means to prevent a new disaster for the Jewish people. There were allegations against Israel, already from 1948, of the use of crude and primitive biological "weapons" against Arabs.⁸² During the first decades of Israel's existence, chemical and biological weapons were probably seen as a non-conventional deterrent capacity that could be made operational in a relatively short timeframe. Nuclear weapons, as the ultimate deterrent choice, would take much longer to develop.

From the early 1960s and onwards, some of Israel's neighbours, such as Egypt, are thought to have had offensive chemical weapons capacity, and maybe also access to biological weapons. Our assessment is that also Israel had active CBW programs at the time. When nuclear weapons became operational around 1967, the nuclear program consequently replaced the Israeli BW program as the strategic weapon of choice. The CW

⁷⁹ Cohen A, 'Israel and Chemical/Biological Weapons: History, Deterrence, and Arms Control', *The Nonproliferation Review*, Fall-Winter 2001, vol. 8, No. 3.

⁸⁰ Burke GM. and Flowerree CC, *International Handbook on Chemical Weapons Proliferation* (Greenwood Press: New York, 1991), ISBN: 0-313-27643-9.

⁸¹ Cohen A, *Israel and the Bomb*, (Columbia University Press: New York, 1998), p. 11.

⁸² Cohen A, 'Israel and Chemical/Biological Weapons: History, Deterrence, and Arms Control', *The Nonproliferation Review*, Fall-Winter 2001, vol. 8, No. 3. p. 31.

program however was kept for many years as a tactical deterrent against Israel's CW capable neighbours.

5.2 Israel's Nuclear Weapons Program⁸³

The nuclear capability is central to Israel's present deterrence. The nuclear development was initiated after independence and the Israeli Atomic Energy Commission was created in the spring of 1952. The agreement to start building the Dimona research reactor, which was to become central for the nuclear development, was signed by France and Israel in October 1957. With Algeria calling for its independence and Nasser seen in France as a force behind this upheaval, France was backing the idea of a strong Israel to balance Egypt. Dimona was not publicly disclosed until 1960 when a statement was issued in the Israeli Knesset. In a meeting on April 2, 1963, Shimon Peres assured the U.S. President Kennedy that "we will not introduce nuclear weapons to the region, and certainly we will not be the first". This remark, and slightly different versions of it, has since then been repeated over and over again by Israeli officials. In March 1965, it appeared for the first time in a document, a U.S.-Israeli Memorandum of Understanding. Kennedy also persuaded Israel to sign the Partial Nuclear Test Ban Treaty in August 1963, in which signatories promised not to perform atmospheric nuclear weapon tests.

By late 1966 or early 1967, the reprocessing plant at Dimona had produced enough plutonium for Israel's first nuclear device. By the Six-Day War in June 1967, it is believed that Israel had prepared a couple of nuclear devices that could have been delivered to a target by an airplane. Towards the end of Johnson's Presidency, the U.S. was trying to persuade Israel to sign the NPT which had been opened for signature in mid-1968. Israel took part in the negotiations and in return for their signing Tel Aviv was seeking U.S. Phantom jets to strengthen its conventional weapons capacity. In addition, Israel wanted an American guarantee to maintain Israel's military superiority in the Middle East and to shield Israel from Soviet aggression. Despite never signing the NPT, Israel received U.S. fighter jets. With the change of presidents in January 1969, the NPT issue quietly disappeared from the U.S.-Israeli agenda. Both President Nixon and his security advisor Henry Kissinger were ready to accept that Israel needed nuclear weapons for its own security.

After losing the Six-Day War, Egypt shifted its attention from Israeli nuclear weapons to the issue of regaining lost land and restoring Arab armed forces. Then, as long as Israel did not openly declare its nuclear capability, the Arabs could ignore the issue. Nuclear ambiguity thus suited both sides in the conflict. The nuclear issue also disappeared from the Israeli internal political debate after 1967. There were several reasons for this: First, the nuclear project was now no longer perceived as Peres's vehicle to power. Secondly, Israeli nuclear weapons were a reality, not just a vision. Thirdly, advocates of a strong conventional capability had joined ranks with nuclear advocates in the newly-formed Labour Party.

With Israel's opposition to the NPT in mind, it was somewhat surprising that Israel decided to sign the CTBT when it was opened for signature in 1996. Signatories to the

⁸³ The following text about the creation of the nuclear capability relies heavily on information from the two major works on Israel's nuclear weapons program: Avner Cohen's *Israel and the Bomb*, published in 1998, and covering the period from Israel's independence until 1970; and Seymour M. Hersh's *The Samson Option*, first published in 1991, which discusses the Israeli nuclear program up to that time.

CTBT promise not to perform any tests leading to nuclear explosions.⁸⁴ Signing the CTBT shows the Israeli confidence in its nuclear capability. There are reports of Israeli observers being allowed at French nuclear weapons tests during 1960-64. Thus, Israel then probably also received firsthand information on nuclear device construction. There are also indications of an Israeli nuclear weapons test in the Indian Ocean in 1979 (Appendix 2) that would have bolstered the Israeli nuclear confidence to such a degree that a future CTBT ratification would not appear too farfetched.

The Knesset has never discussed nuclear policy openly, usually treating the subject as if it does not exist. However, in 2000, the nuclear issue was “debated” in the Knesset. Issam Mahoul, who represents the Arab communist party Hadash, then wrote a motion to debate the nuclear issue and threatened, when the Knesset Speaker was about to direct it to a closed-door session of the Defence and Foreign Affairs Committee, to battle the procedure in the Israeli High Court of Justice. To avoid that embarrassment, the Speaker decided to allow Mahoul to present his motion in an open session.⁸⁵

The historic open session ended after 52 minutes and instead of concentrating on the issue it became a shouting match between Mahoul and his critics about the legitimacy of the debate itself. Four other Arab Knesset members were dismissed after interrupting a response by government minister Haim Ramon and several right-wing members staged a walk-out. When the vote was held the following week on whether to hold a wider debate, it was defeated 61 to 16.⁸⁶

5.3 Israel's Current Nuclear Arsenal

After Mordechai Vanunu in 1986 supplied the British newspaper *The Sunday Times* with a set of photographs of the reprocessing plant at Dimona, until then hidden from the public, there has been little doubt among analysts concerning the success of the Israeli nuclear weapons program. Today, it is estimated that Israel has an arsenal in the range of 100-200 warheads.^{87,88} Understandably, it is difficult to estimate the nuclear weapon arsenals of the known nuclear states since very few details concerning nuclear weapons usually are made public. Naturally, it is then even more difficult to estimate a program that does not officially exist.

It seems quite certain that Israel has at least developed its nuclear force for delivery by aircrafts, such as F16 and F-4E-2000, and by the land-based missiles Jericho I and Jericho II. The Jericho II, which was deployed in 1990, has a range of 1 500 - 4 000 km as

⁸⁴ The CTBT enters into force 180 days after the 44 States listed in Annex 2 to the Treaty have all ratified. Currently, 41 Annex 2 States have signed and 33 have ratified the Treaty. For additional information, see URL <<http://www.ctbto.org>>

⁸⁵ Makhoul I, Debate in the Knesset on Nuclear Weapons and Mordechai Vanunu, *The Lawyer's Committee on Nuclear Policy*, 2000. URL <<http://www.lcnp.org/disarmament/policypractice/Knessetdebate.htm>>

⁸⁶ Cohen A, 'The bomb that never is', *Bulletin of the Atomic Scientists*, vol. 56, No. 3, 2000, pp. 22-23.

⁸⁷ Norris RS, Arkin W, Kristensen HM, and Handler J, 'Nuclear Notebook', *Bulletin of the Atomic Scientists*, vol. 58, No. 5, 2002 pp. 73-75.

⁸⁸ Kile SN and Kristensen HM, 'World nuclear forces: IX. Israeli nuclear forces', *SIPRI Yearbook 2005*, (Oxford University Press: Oxford, 2005), pp. 600-602.

compared to its predecessor's 500-km range.⁸⁹ The three modern submarines, the Dolphin, the Leviathan, and the Tekumah, which were delivered to Israel in 1999-2000, appears to have given Israel a third pillar of nuclear defence. Whereas the first two submarines were paid for by Germany, because Scuds shot at Israel during the 1991 Gulf War were equipped with warheads at least partially developed by German firms, the Tekumah was financed by Israel itself. In 2004, Israel and Germany signed a deal for two more submarines for delivery not earlier than 2008.⁹⁰ Already in 2000, Israeli tests with nuclear-capable cruise missiles were reported to have taken place in the Indian Ocean.⁹¹ A comment made by a former navy commander, Major General Avraham Botzer, in 1990: "The submarines must be a means of the State of Israel, not just the navy",⁹² emphasizes the strategic importance Israel now places on submarines. A fourth line of Israeli nuclear arms development may be tactical nuclear weapons such as landmines and artillery shells. There are no indications of an Israeli development of deeply-penetrating nuclear weapons. For obvious reasons, such a development would be of interest regarding Israel's line of action towards Iran.

The present Israeli doctrine for use of nuclear weapons is unknown. In the past the use of nuclear weapons was reserved for situations with an existential threat against the State of Israel such as:

- Arab military penetration into populated areas within Israel's post-1949 borders
- The destruction of the Israeli Air Force
- Massive attacks with biological and chemical weapons on Israeli cities
- The use of nuclear weapons against Israeli territory.⁹³

To summarize, it is indisputable that Israel has a nuclear capability and it is equally indisputable that the current Israeli position towards possession of nuclear weapons is not likely to change in the foreseeable future.

5.4 Chemical and Biological Weapons

Israel's track record of the use of non-conventional weapons stems back to the time of the foundation of the nation. There are well-grounded accusations of Israeli use of biological agents to prevent reoccupation of conquered Arab villages during 1948.⁹⁴ Bacteria causing dysentery and typhoid were mentioned as agents of choice. Outbreaks of cholera in Egypt in November 1947 and on the Palestine-Syrian border in February 1948 have also been ascribed to biological warfare by Israel⁹⁵.

⁸⁹ Center for Defense Information, 'The World's Nuclear Arsenals', URL <<http://www.cdi.org/issues/nukef&f/database/nukearsenals.cfm#Israel>>

⁹⁰ Harel A, 'Navy eyes 2 new Dolphin submarines', *Ha'aretz*, 10 Sept. 2004.

⁹¹ Mahnaimi U, and Campbell M, 'Israel Makes Nuclear Waves With Submarine Missile Test', *Sunday Times (London)*, 18 June 2000.

⁹² Melman Y, 'Swimming with the Dolphins', *Ha'aretz*, 9 June 1998.

⁹³ Cohen A, *Israel and the Bomb*, (Columbia University Press: New York, 1998), p. 237.

⁹⁴ Cohen A, 'Israel and Chemical/Biological Weapons: History, Deterrence, and Arms Control', *The Nonproliferation Review*, Fall-Winter 2001, vol. 8, No. 3.

⁹⁵ Hamilton TJ, *New York Times*, 24 July 1948.

A biological warfare unit, “Hemed Beit”, was formed within the IDF Science Corps as early as 1948.⁹⁶ The unit for biological warfare moved from its first location in Jaffa to the outskirts of Ness Ziona after the 1948 War. A reorganisation then converted the military science unit to a military sponsored research institute. In 1952 the merger of the biological warfare and another Ministry of Defence research unit resulted in the foundation of Israel Institute for Biological Research (IIBR).⁹⁷

Israel’s hostile neighbourhood during the 1950s was a strong incentive for Israel to continue its developments of the BW and CW programs as a complement to its conventional arsenal until that arsenal was sizeable enough to meet the Arab states. None of the Arab states had, to our knowledge, any significant chemical or biological offensive capacity at the time.⁹⁸ Thus, the Israeli development was more of an offensive nature than a pure defensive and protective program.

Examples of international support during this time are the U.S.-sponsored BW-related research, i.e. at the Hebrew University of Jerusalem; projects concerning immunizing effects of Brucella wall (grants from U.S. Department of Agriculture), molecular events in the replication of Vaccinia virus (grants from U.S. National Institute of Health) and prevalence and distribution of arboviruses (grants from U.S. Army). The connection between the defence establishment at Ness Ziona with the Hebrew University was also obvious; Ness Ziona was the granting agency of a project dealing with rapid identification of toxins.⁹⁹

The CBW capacity was probably seen as a relatively fast way to develop a non-conventional capacity while the nuclear program matured. It is claimed that in 1955 Ben-Gurion initiated a project to more quickly develop a non-conventional weapons capacity that would be more rapidly available than the nuclear option.¹⁰⁰ There is one unconfirmed report that Israeli scientists visited a French testing site for CBW in the Algerian Sahara around 1960.¹⁰¹ Another rare reference to actual Israeli testing of CW is later found in a 1990 report by U.S. Defence Intelligence Agency.¹⁰² According to the report Israel maintains a CW testing facility in the Negev desert.

There is other information and events that point to the fact that Israel had ongoing offensive CW programs. One reference is found in a 1974 statement before the Senate

⁹⁶ Cohen A, ‘Israel and Chemical/Biological Weapons: History, Deterrence, and Arms Control’, *The Nonproliferation Review*, Fall-Winter 2001, vol. 8, No. 3.

⁹⁷ *ibid.*

⁹⁸ It is generally believed that the first Arab country in the region to develop a capacity to use, and produce, CW was Egypt. Several very strong allegations exist of heavy Egypt use of CW during Egypt’s intervention in the 1963-1967 Yemen War. It is however not believed Egypt possessed a significant CW capacity before the early 1960s.

⁹⁹ Report by the Chairman of the Authority (The Hebrew University of Jerusalem) for Research and Development, submitted to the Board of Governors, March 1966.

¹⁰⁰ Cohen A, ‘Israel and Chemical/Biological Weapons: History, Deterrence, and Arms Control’, *The Nonproliferation Review*, Fall-Winter 2001, vol. 8, No. 3., p. 40.

¹⁰¹ Hersh SM, *The Samson Option*, (Random House Inc.: New York, 1991), pp. 63-64.

¹⁰² The report is cited in: EJ Hogendoorn, ‘A Chemical Weapons Atlas’, *The Bulletin of the Atomic Scientists*, vol. 53, No. 5, 1997.

Armed Forces Committee, where it is said that the Israeli CW program is operational.¹⁰³ According to the transcript of the statement, Israel is believed to have a CW program whereas there are uncertainties surrounding any BW program.¹⁰⁴

The Economist Foreign Report, in an article that discusses Israel advising China in conventional and CW matters, states in 1984 that Israel now has stockpiles of nerve agents, mustard gas and several riot-control agents.¹⁰⁵ These stockpiles are said to be a response to the alleged Egyptian use of CW (mustard gas and tear gas) in the Yemenite civil war in 1963-67. Israel is also said to have gathered intelligence immediately before the 1967 Six-Day War that disclosed Egyptian stockpiles of nerve agents in the Sinai Peninsula.¹⁰⁶ It is however highly questionable if Egypt had access to nerve agents at the time.¹⁰⁷

In 1992, an Israeli El Al cargo Boeing 747 crashed in a residential area in Amsterdam, killing 43 people. Six years later, the aftermath of this tragedy gave a rare insight into the Israeli CW research when it was finally officially admitted that the airplane had carried a precursor chemical for the nerve gas sarin.¹⁰⁸ It was revealed that the plane was on route to Israel from the U.S. Apparently the chemical, 190 litres of dimethyl methylphosphonate (DMMP), had been sold by an American company to IIBR and an export licence had been obtained from the U.S. Department of Commerce.¹⁰⁹ The chemical would be used to test filters for personal and collective protection according to the licence¹¹⁰. It appears more likely that the import of DMMP in this case was connected to the CW protection program than for use in CW production. To minimise exposure of the offensive CW program, it is reasonable to assume that it is, both administratively and physically, separated from the CW protection program.

In 1998, an Israeli military source is quoted to have said that Israeli crews of F-16 fighters, within minutes of receiving the command to attack, have been trained to load active chemical or biological weapons on their airplanes.¹¹¹ This reference is to our knowledge one of the few that actually states that Israel could have stockpiled CBW at its military installations as late as in the late 1990s.

¹⁰³ SHogendoorn EJ, 'A Chemical Weapons Atlas', *The Bulletin of the Atomic Scientists*, vol. 53, No. 5, 1997, pp. 35-39.

¹⁰⁴ Parts of the transcripts are sited in Burke, GM and Flowerree, CC, *International Handbook on Chemical Weapons Proliferation*, p. 192.

¹⁰⁵ Anonymous, 'China and Israel', *Economist Foreign Report*, 12 July 1984, pp. 5-6.

¹⁰⁶ *ibid.*

¹⁰⁷ Burke GM and Flowerree CC, *International Handbook on Chemical Weapons Proliferation* (Greenwood Press: New York, 1991), ISBN: 0-313-27643-9, pp. 227-229.

¹⁰⁸ Anonymous, 'El Al: Carrying sarin component legal', *The Jerusalem Post*, 2 Oct. 1998, p. 5.

¹⁰⁹ Anonymous, 'Bucks Firm Sold Sarin Component', *Philadelphia Daily News*, 3 Oct. 1998, p. 8.

¹¹⁰ DMMP, which contains a phosphorus atom, is a well-known simile substance that is used for testing CW detection and indication instruments. The substance could very well also be used for penetration tests of protective equipment. It should also be stressed that 190 litres of precursor is nowhere near the amounts of this chemical that is needed for an actual production and weaponisation of a military significant amount of nerve agents.

¹¹¹ Mahnaimi U, "Israeli jets equipped for chemical warfare", *Sunday Times (London)*, 4 Oct. 1998.

An incident pointing to the existence of an Israeli BW program is the account of the former deputy head of the IIBR, Marcus Klingberg, who suddenly “disappeared” in 1983 when he attended a scientific conference in Switzerland. For several years nothing was known about his destiny until it emerged 10 years later that he had been arrested for espionage in 1983. No exact details were revealed by Israeli authorities concerning his arrest, except that he was accused of spying for the Soviet Union, by passing information on biological warfare. The treatment and secrecy around Dr. Klingberg shows many similarities with the case of Mordechai Vanunu, who was kidnapped and arrested in 1986 after revealing the existence of a nuclear reprocessing plant at Dimona. The concealment of Klingberg’s arrest could have been a cover-up of a BW program that was administered by Klingberg, and where he had valuable and sensible information that, if disclosed, would harm the reputation of Israel.^{112, 113}

5.5 Current Science and Technology Research

Israel’s present WMD capacity stems from a longstanding tradition of excellence in science and research. Some basic research facilities were even established by the Jewish community in Palestine before the creation of the state of Israel.¹¹⁴ Today the Israeli science and technology sector is among the most developed in the world. For a more comprehensive review of this section, additional information can be found in Appendix 1.

Israeli scientists are frequently publishing research papers on both BW relevant organisms and CW relevant substances. These publications are of purely defensive and protective nature. It is, however, possible to conclude from scientific publications that Israel today possesses an advanced general knowledge of modern CBW agents.

The competence of Israeli physicists (for the nuclear sector) is also generally regarded within the scientific community as being of the very highest standard.

Our analysis of the research related to chemical and biological warfare agents conclude that the IIBR is the major institute in the CBW defence area.

The IIBR was founded in 1952. All personnel are employed by the Prime Minister's office, but the IIBR is since 1992 coordinated and budgeted by the Special Means Bureau at the Ministry of Defence.¹¹⁵ Today the policy for the IIBR is to be an agency, based on a scientific mandate, which has the primary national responsibility for Israel's response to all CBW threats.¹¹⁶ Judging from the publications in scientific journals and abstracts from scientific meetings, the institute conducts very advanced research at the forefront of molecular biology and medical chemistry.

¹¹² Pringle P, ‘Missing’ Israeli Scientist Was Jailed as Spy’, *Independent*, 4 Aug. 1993.

¹¹³ Amnesty International Appeal Letter, 1997. URL
<<http://web.amnesty.org/library/Index/ENGMDE150141997?open&of=ENG-348>>

¹¹⁴ Israel Ministry of Foreign Affairs, *Science & Technology (2004 edition)*, URL
<<http://www.mfa.gov.il/MFA/Facts+About+Israel/Science+-+Technology/SCIENCE+AND+TECHNOLOGY.htm>>

¹¹⁵ NTI Country Overview, *Israel*. URL
<http://www.nti.org/e_research/profiles/Israel/Biological/3649.html>

¹¹⁶ *ibid.*

The IIBR is located in Ness Ziona. Considering the dual use nature of the knowledge and technologies that are involved, the activities of the institute undoubtedly must cause suspicions from outside observers. Since the institute is surrounded by much secrecy, it is inevitable that rumours about the activities within the institute occur. A report in an Israeli newspaper in 1998 regarding CBW activities inside the institute resulted in that the Ness Ziona municipality decided to file a petition with the aim to stop an expansion of the IIBR.¹¹⁷ The present status of these expansion plans is unknown to us.

5.6 Industries within the Chemical and Biological Field

Israel is a highly developed research nation with many high-tech projects, and it is a defined goal of the Israeli government to foster the nation's intellectual capital into viable research projects and successful companies. In order to enhance the support to the industry, technology transfer companies are established at most of the Israeli universities and Israel has also established a very ambitious "Technological incubators program" to funnel high-tech research efforts and business ideas into commercial viable companies¹¹⁸ (see Appendix 1). The Israeli chemical and biotechnical industry is very well developed in many sectors and the government is actively promoting further development. However, the natural resources in Israel are somewhat limited and the chemical industry is dependent on imported raw material. We still estimate that some of Israel's advanced chemical and biotechnical industries, as in many other industrial nations, have the potential for being utilized for domestic production of both biological and chemical weapon agents if so would be desired (see Appendix 1).

5.7 Israel's Biological and Chemical Warfare Capacity

Israel does not stockpile or produce BW in large-scale today. However, we assess that Israel has a breakout capability¹¹⁹ for biological weapons and also CW, i. e. the knowledge needed to implement theoretical knowledge into the practical management of production and deployment of CBW. The knowledge base would be the one that was built during the 1950s and 1960s where today's advanced research can be used to upgrade potential BW and CW agents and their behaviour in the environment. We have not found any conclusive evidence that show that Israel's offensive programs still remain active today. By active offensive CBW programs we mean:

- an active R&D to develop and/or improve warfare agents,
- the development of improved production techniques for specific warfare agents,
- the optimization of agents for large-scale dissemination in the environment,
- continuously ongoing production of specific warfare agents and weaponization of these agents or

¹¹⁷ Marcus A, 'In Israeli town, rare challenge to arms plant', *Boston Globe*. 24 Nov. 1998, p A01.

¹¹⁸ Office of the Chief Scientist, Ministry of Industry and Trade, Tel Aviv, *Technological incubators in Israel*, URL <<http://www.incubators.org.il>>

¹¹⁹ See the Final report of Iraq Survey Group where break-out capability is defined as "a CW breakout capability to be the capacity of Iraq to de novo produce and field militarily significant CW rapidly. An example of a breakout scenario would be wartime or imminent threat-precipitated production of dubious quality, low-stability agents for immediate use. A breakout capability could be deliberately developed during peacetime or improvised in response to a threat.

- continuously upgrading deployed operational weapons and storage depots for bulk agents to be used in weapons or the ready-made operational weapons.

The advanced pharmaceutical industry in Israel can provide the country with valuable knowledge on production of biological agents and formulation of aerosolized biological material. Besides a production capacity, a country that is proliferating within the BW field is also, among other things, helped by domestic strain collections for micro organisms and large animal facilities. In Israel, there are two strain collections for micro organisms¹²⁰ and one large animal facility, the Mazor farm, which imports monkeys from Malaysia and exports what is not needed for domestic purposes to countries in Western Europe¹²¹. Strain collections and animal facilities are certainly not a proof of an active BW program, but we note that agents, knowledge and facilities are present and easily within reach in Israel.

The establishment in Ness Ziona with all the secrecy around that facility clearly indicates that activities were going on in the past that was not supposed to be transparent for the public. The great reluctance to talk about the establishment still exists and scientists from Israel do barely want to touch on the subject at international scientific meetings.¹²² Our assessment is that the main portion of the biological research performed in Ness Ziona today is for BW protection.

Considering Israel's security environment with dominating domestic problems and the experience from earlier wars, it is conceivable that Israel has so called "dirty trick" programs for BW and CW that aim at developing agents for small-scale covert use. Development of "dirty trick" departments was a part of some of the former offensive programs in the U.S., the Soviet Union and South Africa. These programs specialised on substances and agents that could kill quickly, quietly and effectively, and where manufactured agents could be used covertly, in, for example, assassinations.^{123 124 125} Israel also has a history of using BW agents in small scale covert operations during the War of Independence (see above).¹²⁶

A more modern example covert use of CW is the assassination attack on a Hamas leader in Amman 1997. According to press sources, the Israeli security agents attempted to assassinate the Jordan based Hamas leader Khaled Meshal.¹²⁷ The reported plot was to spray a suitable dose of the anaesthetic Fentanyl in the ear of Meshal. The chemical

¹²⁰ Two culture collections of prokaryotes, URL <<http://www.bacterio.cict.fr/collections.html>>. 1. Central Laboratories, Ministry of Health Jerusalem, Jaffa Street 86, Jerusalem, Israel, 2. Volcani Center Rhizobium Collection, Dept. of Agronomy and Natural Resources, Agriculture Research Organization, The Volcani Center, P.O. Box 6, Bet Dagan 50 250, Israel.

¹²¹ The Israeli Society for the Abolition of Vivisection, 'Shut Down Mazor Farm', URL: <<http://www.aesop-project.org/Israel/ShutDownMazorFarm.PDF>>

¹²² Milton Leitenberg, personal communications, 2005.

¹²³ Regis E, 'The Biology of Doom. The History of America's Secret Germ Warfare Project', (Henry Holt and Company, LLC: New York, 1999).

¹²⁴ Alibek K, 'Biohazard', (Random House: UK, 1999).

¹²⁵ Gould C and Folb P, 'Project Coast: Apartheid's Chemical and Biological Weapons Programme', (United Nations Institute for Disarmament Research (UNIDIR): Geneva, 2002).

¹²⁶ Hamilton TJ, *New York Times*, 24 July 1948.

¹²⁷ Cowell A, 'The Daring Attack That Blew Up in Israel's Face', *New York Times*, 15 Oct. 1997

would then be absorbed by the skin and later cause his death. By then, it would be hard to forensically detect the deadly agents in the victim. The attack was conducted more or less as planned, but was noticed by bystanders, which in the end led to the arrest of the two perpetrators and four others fled to the Israeli Embassy. The event led to a serious diplomatic crisis between Israel and Jordan, and in the end Israel revealed what chemical that had been used.¹²⁸ Fentanyl was later used by Russian authorities in the Moscow Dubrovka theatre siege in 2002 to try to sedate the hostage takers, but with well known fatal consequences.

In connection with the event in Jordan, Israeli “government officials” were quoted in *Time Magazine* to have told the paper that “the chosen method of assassination had been, until now, foolproof” and “the decision to act was taken based on the 100% success rate of this method, which left no fingerprints whatsoever. If they had done it in the right way, no one would have noticed”, indicating that the method, or similar methods, had been used before.¹²⁹

We assess that Israel does not have an active production of “traditional” CW agents today. However, as stated above many indications exist that Israel has had an advanced CW program in the past, including nerve agents. Chemical agents and weapons produced within this program could very well still be functional and stockpiled today. If such stockpiles exist depends on the quality and type of agents and weapons produced in the past program. The advanced CW program could very well have been developing binary nerve agents¹³⁰ which are very suitable for long-time storage. However, no hard evidence exists that can confirm this type of agents. The potential Israeli CW stockpiles would not be deployed at military installations, such as airfields, but rather centrally stored ready to be transported to suitable locations if needed.

¹²⁸ *ibid.*

¹²⁹ Beyer L, Hamad J, and Klein A, ‘What went wrong?; The botched hit on a Hamas leader in Jordan is the latest big problem for Israel’s Benjamin Netanyahu’, *Time Magazine*, 27 Oct. 1997, p. 52.

¹³⁰ Binary nerve agents are a CW that consists of two relatively non-poisonous chemical components that by themselves are not considered as chemical weapons agents, but when mixed form a highly toxic substance. The two components are stored separated from each other, either in a weapon where they are mixed during launch or in separate containers. In the latter case the components can be mixed and assembled into a weapon before use.

6 Conclusions and Discussion

Since the late 1960s Israel has been in possession of nuclear devices. Today, Israel probably keeps its nuclear warheads in an unassembled mode. But, if a situation was to arise in which nuclear weapons would be needed, fully functional weapons could be completed in a matter of days.

In addition to Israel's nuclear capability, the state previously developed offensive biological and chemical warfare capabilities. It has not been possible to conclude if these offensive programs still remain active today. However, Israel has the scientific know-how and the industrial infrastructure to *de novo* produce and deploy militarily significant CBW rapidly if so desired.

In our view, the focus of the Israeli chemical and biological capacity today is to develop agents for small-scale covert use, i.e. a so called "dirty tricks" program.

Israeli incentives for embarking on a scientific track to develop WMD were present and strong from the beginning of the state's formation. The most central aspects of these incentives were the combination of being a small country with very limited resources, together with the fact that Israel had no close allies in a hostile region where the neighbouring Arab states denied it its right to exist. Thus, a WMD capability was indispensable in order to support the limited arsenal of conventional arms and troops, highlighting Israel's all encompassing objective to acquire all available means to secure the newly formed Jewish state.

Israel initiated offensive programs in all fields with the knowledge that a military significant CBW capability was the fastest way to reach a military operational capacity with a strategic impact, while the nuclear track would take longer time to develop.

The Israeli nuclear capability had a profound impact on Israel's scope of manoeuvring in regard to defence and foreign policy. Israel had secured a retaliatory capability in the event of an Arab coalition threatening the Israeli heartland. Moreover, Tel Aviv's new strategic capability influenced the relationship with the U.S. towards a more profitable position in regard to acquisition of modern conventional weapon systems in exchange for a restrictive stance in the Israeli nuclear deterrence strategy.

The upsurge of proliferation of WMD related technology and ballistic missiles in the region after the 1973 Yom Kippur War necessitated an Israeli CBW arsenal for deterrence in kind. An escalatory capability of WMD was, and probably to some extent still is, essential to the Israelis in order to enhance the credibility impact of a massive deterrence and retaliatory capability against the Arab states.¹³¹

Since the early 1990s the Israeli security context has gradually improved. Syria is probably the only actor in the region today with a military significant chemical weapons arsenal. However, the Syrian capacity is not perceived by Israel as an existential threat

¹³¹ For the Syrian Defence Minister's view of the risk of escalation from biological to nuclear warfare, see: 'Biological Warfare, A New and Effective Method in Modern Warfare', Saff, 22 Nov. – 27 Dec. 1999, pp. 38-42 (Persian). FBIS Translated Text IAP20000501000119.

that could motivate a deployment of chemical and/or biological weapons, unless the Syrian CW-arsenal is coordinated with other neighbouring state's military capabilities. However, the development of a nuclear program in Iran has made Teheran a new emerging existential threat to the Israeli leadership.

6.1 Discussion

6.1.1 Future Israeli Policy Development

Despite reports of Israeli offensive programs since the 1970s Israel has not been addressed in non-proliferation activities in the same manner as other states in the region. Western countries have shown little concern for dual-use exports to Israel which is visible through the denial and catch-all notifications of the export control regimes such as the Australia Group. Only a handful of notifications have addressed Israel in the CBW dual-use technology realm during the period from 1991 through 2001, despite the offensive profile of Israel's policy of ambiguity. Under current circumstances there are clearly no incentives for Israel to adhere to the CWC or BTWC, and the EU non-proliferation strategy in the region fails in establishing disincentives for the traditional Israeli WMD profile.

Economical disincentives such as trade restrictions towards non-member states regarding listed dual-use products could have an effect on Israel. The trade restriction option is available within the CWC and, if applied, could be burdensome for the Israeli industry in general and the IT- and pharmaceutical industry in particular. This might force the Israeli government to revise its cost-benefit analysis regarding its traditional deterrence strategy and policy of ambiguity.

Israel's policy of ambiguity has influenced its political standpoint in regard to international WMD conventions. Israel's nuclear capacity which is fundamentally linked to the optimal ability for deterrence and counterstrikes in case the state's existence is threatened has contributed to a dead-lock with respect to the NPT. However, ratification of the CTBT may be an option since Israel has won its present nuclear capability without making any official tests. In this case, it may just be a question of presenting the right incentives to land an Israeli ratification of the CTBT. If the U.S. came up with such an incentive, which will not happen during the present U.S. Administration, Israel might be persuaded to take such a step.

At present, with an Iranian nuclear program still in its youth and an overwhelming Israeli military superiority, we assume that Israel in the present situation has decided to play a waiting game with its nuclear arsenal. If the international community allows Iranian nuclear development to proceed beyond the point which Israel cannot accept, we may again see an Israeli military strike with conventional weapons against a Middle East reactor. After striking against the Iraqi Osiraq reactor in 1981, Israel was almost universally condemned for its raid,¹³² but a decade later more or less forgiven when the extent of the clandestine Iraqi program was revealed. With the Osiraq scenario and aftermath in mind, the Israeli threshold for action against Iran may be lower than generally expected.

¹³² UN Security Council Resolution 487, 19 June 1981, URL
<http://www.un.org/Docs/sc/unsc_resolutions04.html>

The Israeli position in regards to CWC and BTWC is difficult to assess due to Israel's silent posture, but it is reasonable that an Israeli adherence to the CWC could to a large degree serve Israeli interests in several aspects. Israel would advance its international standing considerably by improving its own WMD profile, especially during current circumstances when the security dilemmas of the region are in focus. Furthermore, an Israeli accession to the CWC would contribute to the international agenda as leverage in the efforts to put pressure on other states in the region to improve their transparency in these aspects. In retrospect, it is obvious that Israel has nothing to gain by continued adherence to its traditional argument for not ratifying the convention, which is based on the Arab states refusal to sign the CWC.¹³³ In our view, the reason behind Israel's position concerning the conventions is that the ambiguous policy in regards to chemical and biological weapons still serves a vital purpose in Israel's overall strategy of projecting a credible and massive deterrence capability.

The deterrence policy, which constitutes a cornerstone in Israeli security policy, seems to be shaped by the Israeli defence planners' outlook that they simply can not forsake any means of the ability to, through self-reliance, reassure the state of Israel's future existence. Especially when the international community seems to show a great deal of tolerance for Israel's unique security situation, and thereby pays less attention to its choice of means for defensive and deterrent measures. Iran and the Arab states, foremost represented by Egypt and Syria, have since mid-1970s called for the creation of a nuclear- and WMD-free zone in the Middle East, with the clear aim of placing the Israeli nuclear arsenal in the limelight. The Egyptian and Syrian position is that the Israeli nuclear arsenal constitutes a central factor in the security dilemma between the parties, and that any effort towards creation of a security arrangement in the region has to include the issue of the Israeli nuclear capability. However, the efforts by the Arab states to bring Israel's WMD programs to the forefront of the international agenda have failed to achieve their objective. The United States and the United Kingdom have presented a united front in defending the Israeli position and have announced that other states in the region have to take the first steps towards disarmament, implying that Israel's possession of WMD is legitimized by its precarious security situation.¹³⁴ This attitude might very well constitute a disincentive for an Israeli decision to accede to the conventions and disarm a possible stockpile of chemical weapons. This provides a notion of an unbalanced disarmament agenda, on the international community's behalf, which needs to be adjusted in order to dissolve the underlying mechanisms behind the dead-lock permeating the WMD problem in the region.

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¹³³ Anonymous, 'Israel Won't Ratify Chemical Weapons Pact', *The Jerusalem Post*, 5 Sept. 1997.

¹³⁴ La Guardia A, 'US and Britain get tough with Syria over arsenal', *The Age (London)*, 8 Jan. 2004.

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Israeli science and technology

General background

According to an Israeli comparative study, that monitored Israeli research between 1999 and 2003, Israel stands up very well to comparable countries.¹³⁵ The study measures different research indicators based on statistic material. The productivity, measured as scientific publications per capita, shows that Israel is among the most science productive countries in the world, only surpassed by Switzerland and Sweden. The study also measured the quality of the publications, using the well-established citation index method (“impact factor”). According to the authors of the report Israel shows a high rank in material science, astrophysics, computer sciences, molecular biology and chemistry. It ranks comparatively low in clinical medicine, ecology and social science.¹³⁶ The Israeli Ministry of Foreign Affairs states that Israel spends approximately 4.5 % of its Gross Domestic Product on civilian research and development, as a comparison Sweden spends approximately 4.1% and the U.S. 2.2 %.¹³⁷

More than 80 % of the published Israeli research is conducted at the universities.¹³⁸ Much of the competitive basic research funding is administrated through The Israeli Science Foundation that supplied grants to around 1,000 individual researchers during 2003.¹³⁹ In addition, basic research is also funded via the universities and other foundations.

The Council for Higher Education in Israel, which is the institution in Israel responsible for higher education, lists eight universities within the country.¹⁴⁰

- The Hebrew University of Jerusalem, <http://www.huji.ac.il>
- The Technion, <http://www.technion.ac.il>
- Tel-Aviv University, <http://www.tau.ac.il>
- Bar-Ilan University, <http://www.biu.ac.il>
- The University of Haifa, <http://www.haifa.ac.il>
- Ben-Gurion University of the Negev, <http://www.bgu.ac.il>
- The Weizmann Institute of Science, <http://www.weizmann.ac.il>
- The Open University of Israel, <http://www.openu.ac.il>

¹³⁵ Czapski G and Ilan Y, ‘International Status of Israeli Research: A Comparative Analysis Using Scientometric Indices’, Samuel Neaman Institute for Advanced Studies in Science and Technology, October 2004.

¹³⁶ *ibid.*

¹³⁷ Israel Ministry of Foreign Affairs, *Science and Technology - Research and Development*, URL <<http://www.mfa.gov.il/MFA/Facts%20About%20Israel/Science%20-%20Technology/SCIENCE%20AND%20TECHNOLOGY-%20Research%20and%20Development>>

¹³⁸ *ibid.*

¹³⁹ *ibid.*

¹⁴⁰ The Council for Higher Education in Israel, February 2005, the list can be found on the council’s webpage, URL <<http://www.che.org.il/eng.htm>>

The universities (not including The Open University) had a total of 125,000 students in the academic year of 2003/04 and a teaching and research staff of 10,500 persons (2002/03).¹⁴¹ Of a total of 1,000 doctoral (or equivalent academic degrees) students¹⁴² that graduated from the universities 2002/03, 630 received a degree in medicine, natural sciences, agriculture or engineering.¹⁴³

Nuclear Physics Research

In order to quantify the success of Israeli researchers in this area, we performed a simple study with the help of the Dialog Scisearch@Database. We chose to compare to what degree Israeli, French, German, Japanese, and Swedish nuclear physicists since 2000 had succeeded in publishing their reports in the eight highest ranked (and most prestigious) nuclear physics journals.¹⁴⁴ The results are shown in Table 1.

Table 1. Publications since 2000 in high-ranked nuclear physics journals

Country	Number of reports	Population	Publications per capita
Sweden	402	9 001 774	4.47 E-05
Germany	3 200	82 431 390	3.88 E-05
Israel	184	6 276 883	2.93 E-05
France	1 481	60 656 178	2.44 E-05
Japan	1 871	127 417 244	1.47 E-05

The result of our survey shows that Israel was able to compete with other technically advanced countries and ranked higher than both France and Japan, which are states with a high reliance on nuclear power.

When the whole database, which contains records from 6,100 international scientific and technical journals, was searched for each of the five countries in the period 1990-2005, the order in terms of publications per capita was slightly different. Germany then fell two positions and Israel and France moved up one position in the ranking order. Sweden produced 0.025, Israel 0.023, France 0.013, Germany 0.011 and Japan 0.008 publications per capita in this time frame.

The Israel Institute for Biological Research

IIBR was founded in 1952. It is located in Ness Ziona, about 20 kilometres south of Tel-Aviv. According to the institute's home page the staff is comprised of approximately 350 employees, 150 of whom are scientists holding doctorates in biology, biochemistry, biotechnology, analytic, organic and physical chemistry, pharmacology, mathematics, physics

¹⁴¹ Statistical Abstract of Israel 2004.

¹⁴² As a comparison, 2 588 students received a doctoral (PhD) degree from the Swedish universities in the academic year 2002/03. (Source: Statistics Sweden, <http://www.scb.se/>)

¹⁴³ Israel Central Bureau of Statistics, *Recipients of Degrees from the Universities and Other Institutions of Higher Education, 2002/2003*, URL <http://www.cbs.gov.il/publications/university03/university03_e.htm>

¹⁴⁴ The eight nuclear physics journals that had the highest impact factor in the Science Citation Index® in 2003 were: Advanced Nuclear Physics, Annual Review of Nuclear and Particle Science, Nuclear Physics B, Atomic Data Nuclear Data, Nuclear Fusion, Progress Particle Nuclear Physics, Plasma Physics Controlled Fusion, and Physical Review C.

and environmental sciences. The technical staff consists of 160 certified technicians, representing a broad spectrum of capabilities.¹⁴⁵

IIBR has three scientific divisions: Biological Sciences, Medicinal Chemistry and Environmental Sciences. The scientific activities span from molecular biology, toxicology to detectors, sensors and environmental risk assessments. A significant number of the IIBR research projects are sponsored by international authorities and institutions with a majority of contributors coming from the U.S., among them U.S. Army Medical Research and Development Command.¹⁴⁶

IIBR is, like the Israeli Atomic Energy Commission, under the jurisdiction of the Israel Prime Minister's Office and works in close cooperation with several government agencies.¹⁴⁷ All employees are employed by the Prime Minister's office, but the IIBR is since 1992 coordinated and budgeted by the Special Means Bureau at the Ministry of Defence.¹⁴⁸ Today the policy for the IIBR is to be an agency, based on a scientific mandate, which has the primary national responsibility for Israel's response to all CBW threats.¹⁴⁹ Considering the dual use nature of the knowledge and technologies that are involved, this mission undoubtedly must cause suspicions among outside observers. The control of its activities has not always been tight as can be read from the report issued by the Prime Minister's Office in 1973 where it is stated "while coming under the jurisdiction of the Prime Minister's Office it (i. e. IIBR) is independent in managing its professional activities and determining its own research policy".¹⁵⁰

Research

Judging from the publications in scientific journals and abstracts from scientific meetings, the institute conducts very advanced research, being at the forefront of molecular biology and medical chemistry.

When examining the research for the last five years within the biological field it can be found that there is a focus on a few agents with the aim of understanding disease-causing mechanisms, new identification methods and better medical protection. The agents mainly studied are *Bacillus anthracis* (causing anthrax), *Yersinia pestis* (causing pneumonic and bubonic plague), *Ehrlichia canis* (causing ehrlichiosis), and West Nile virus (causing West Nile fever).

Anthrax and pneumonic plague are two of the most potent agents for use in biological warfare. There are no *well* functioning vaccines against these diseases today. It is therefore obvious that a research effort on these agents should focus on the development of better vaccines and for this it is also necessary to understand how the bacteria is causing the disease and how our immune system is reacting during an infection.

¹⁴⁵ The Israel Institute for Biological Research. URL <<http://www.iibr.gov.il/index.asp>>

¹⁴⁶ *ibid.*

¹⁴⁷ *ibid.*

¹⁴⁸ Nuclear Threat Initiative, *Country Overview: Israel*, URL <http://www.nti.org/e_research/profiles/Israel/Biological/3649.html>

¹⁴⁹ *ibid.*

¹⁵⁰ Extract from "Scientific activities at the Israel Institute for Biological Research in Ness-Ziona for 1973. The report was issued by the Prime Minister's Office.

Ehrlichiosis is not a “classical” BW agent and the research at IIBR is mainly focusing on detection and diagnosis by immunological methods. West Nile fever is a disease that sporadically occurs in Israel.¹⁵¹ Studies performed at IIBR are directed towards medical treatment, vaccine development and epidemiology. One particularly interesting study was published in 2000 by Ben-Nathan *et al* who works at the department of Infectious Diseases at the IIBR.¹⁵² The study shows that by treating mice with inhalation anesthetics before infecting them with a normally harmless isolate of the West Nile virus resulted in the development of encephalitis and death of the mice. No death was observed in virus-infected mice that were not treated before infection with inhalation anesthetics. The take-home of the study was that inhalational anesthetics induce breaching of the blood-brain barrier resulting in a possibility even for a harmless isolate of the virus to infect the brain. The reasons for performing this kind of research is difficult to envision although there is an attempt to explain this in an article on the same subject published in 2002 by the same research group. According to the authors, the research on this matter is important for understanding the potential vulnerability of operating room staff and patients undergoing general anesthesia.¹⁵³ Our conclusion is that this knowledge also can be used for hostile purposes.

The research within the chemical field principally focuses on two agent categories, the organophosphorous (OP) compounds (i. e. mainly nerve agents) and sulfur mustard. The OP compounds studied are sarin, VX, soman and tabun. Prophylaxis and treatment of OP-poisoning are the main foci where novel oximes are studied as well as basic understanding of the mechanisms for inactivation of the OP compounds by different cholinesterases. There are also studies describing long term effect as well as acute pathological effects.

Sulfur mustard is more broadly studied including the distribution of the agent in rabbit tissues, treatment strategies for skin injuries and protection of induced toxicity. Other research within the chemical and toxin area are studies of conotoxins and model systems in neurotoxicology.

Organisation and public relations problems

As previously mentioned, IIBR was established in 1952, and at that time it was located in the outskirts of Ness Ziona. The town has since then increased in size and come closer to the institute. Since the institute is surrounded by much secrecy, it is inevitable that rumours about the activities within the IIBR occur. As a consequence of a report in an Israeli newspaper in 1998 regarding CBW activities inside the institute, the Ness Ziona municipality decided to file a petition with the aim to stop an expansion of the IIBR. The government decided to stop the expansion while an environmental impact study was performed.¹⁵⁴ Still there were concerns in relation to the risk of living so close to an institute that was said to be handling deadly micro organisms and highly toxic chemicals. In an open hearing on IIBR, held by the

¹⁵¹ In the year 2000 a number of cases were reported, the Ministry of Health in Israel reported 151 cases of West Nile fever with 76 cases hospitalised and 12 deaths. Source: WHO Disease Report, West Nile fever in Israel, URL <http://www.who.int/csr/don/2000_09_22/en/>

¹⁵² Ben-Nathan D, Kobiler D, Rzotkiewicz S, Lustig S, Katz Y, ‘CNS penetration by noninvasive viruses following inhalational anesthetics’, *Annals of the New York Academy of Sciences* vol. 917, 2000, pp. 944-950.

¹⁵³ Yeshayahu Katz Y, Lustig S, Ben-Shlomo I, Kobiler D, and Ben-Nathan D. ‘Inhalation anesthetic-induced neuroinvasion by an attenuated strain of West Nile virus in mice’, *Journal of Medical Virology* vol. 66, 2002, pp. 576-580.

¹⁵⁴ Marcus A, ‘In Israeli town, rare challenge to arms plant’, *Boston Globe*. 24 Nov. 1998, p A01.

Israeli Knesset Science Committee in 1997, it was reported that during 18 years there had been four accidents resulting in three deaths and 22 injuries.¹⁵⁵ Although the Prime Minister's Office issued a release saying that the institute never had had any "work accidents in which employees died" there were fears that accidents might put the population in danger. The municipality even put forward requests that the institute should be moved from the town.¹⁵⁶ The present state of the expansion of the institute since 1998 is not known to the authors of this report.

Biological and Chemical Research

The scientific level of Israeli research is also at a world-class level within the areas of molecular biology and microbiology. There are a number of universities and institutes who perform this research and there are also international collaborations between Israeli institutes and a number of foreign institutes.

In 1993, a Canadian case study on Israel's biological and toxin research was performed in which seven laboratories and institutes were identified as the main Israeli laboratories and institutes publishing on biological and toxin matters.¹⁵⁷ This study was extensive and focused on different aspects of biological and toxin research that have a large impact for biological and toxin weapons. Several databases were screened and "samples" were picked from key-word selected Israeli publications from the years 1970 to 1992. The identified laboratories/institutes were:

- Weizmann Institute of Science, Rehovot
- Hebrew University – Hadassah Medical School, Jerusalem
- George S. Wise Faculty of Life Sciences, Tel Aviv University, Tel Aviv
- Ben-Gurion University, Negev, Beer-sheva
- Israel Institute of Biological Research, Ness Ziona
- Faculty of Medicine, Technion, Haifa
- Medical Corps, Israel Defence Forces

In an effort to make an update of the Canadian study, without performing an extensive database search, the seven institutes were again screened by us by searching only one database, Medline, for research within specific areas of interest for biological and toxin research. A more comprehensive search was also performed in order to identify new research institutes that might have appeared as main contributors in the biological and toxin research field after 1992. This was performed by using selection criteria¹⁵⁸ with relevance to the biological and toxin weapons fields.

¹⁵⁵ From extracts of a translation of an article in newspaper *Yediot Aharonot*, 14 Aug. 1998, translation kindly provided by Milton Leitenberg.

¹⁵⁶ Marcus A, 'In Israeli town, rare challenge to arms plant', *Boston Globe*. 24 Nov. 1998, p A01.

¹⁵⁷ Brac Scientific Consulting in collaboration with the Verification Research Unit of the External Affairs and International Trade, Canada, *Collateral analysis and verification of biological and toxin research: A third case study*, 1993.

¹⁵⁸ Eight categories were chosen as described more in detail in the Canadian study. The categories were: 1. microbiology, virology, bacteriology, infectious diseases; 2. toxins, neurotoxins (specific key words for different toxins were also used); 3. recombinant DNA, gene cloning, biotechnology; 4. large-scale production, fermentation, reactors; 5. vaccine technology, immunology, immunization; 6. aerosol,

From the survey it can be concluded that most of the previously identified laboratories and institutes still are dominant in the research on matters with relevance for biological and toxin weapons. The scientific level is very high and the research is judged as being at the very front of biological research. No obvious “newcomer” on the research arena was identified, although there are a number of other laboratories/institutes that publish scientific articles within the field.

The Chemical and Biotechnical Industry of Israel

The Israeli chemical and life science industry consists of basic chemical industries such as mineral production and petrochemicals but also of high-tech companies in, for example, the pharmaceutical sector. According to the Israel Ministry of Trade and Labour, the chemical sector comprises of 400 industrial plants (this might be an exaggeration) that together accounts for 14.5 % of the Israeli total industrial output in 2003.¹⁵⁹ In the overall Israeli industrial export, the chemical sector accounts for 17 %. Israel has some natural mineral resources and other raw materials that are refined within the country (see below) but the chemical industry is dependent on imported raw material.

According to the Israeli Ministry of Foreign Affairs there are four main sectors of operation within the domestic chemical industries; petrochemical industry, fertilizers and other chemicals based on domestic minerals, crop protection chemicals and pharmaceuticals. Some examples of these industry branches are briefly described below.

The Israel Chemicals Ltd. (ICL), a multinational former state-owned company, holds concessions to mine the Negev desert and also to extract minerals from the waters of the Dead Sea. Products are e.g. bromide, potash, magnesium and phosphate.¹⁶⁰ ICL has several different branches and the supply of both potash and phosphate, domestic and abroad, has made ICL one of the world leading suppliers of fertilizers.

Apart from offshore natural gas deposits, Israel has no commercial important fossil fuel resources (oil or coal). However, the country operates two modern oil refineries through the state owned Oil Refineries Ltd (measures have been taken by the Israeli government to privatise parts of the company).¹⁶¹ The two refineries, located in Haifa and Ashdod, have a refining capacity of 220,000 barrels crude oil per day.¹⁶² The production consists of several petroleum base products, e.g. gasoline and fuel oil, and also sulfur. The refineries depend on imported crude oil.

The Israeli producer of crop protection chemicals Makhteshim-Agan Industries Ltd. is a world-leading manufacturer and distributor of herbicides, insecticides and fungicides, as well as other crop protection chemicals and plant growth regulators.¹⁶³ Other products are aroma

lyophilization; 7. specific biological agents (specific key words for different agents were also used); 8. bioregulators (specific key words for different bioregulators were also used)

¹⁵⁹ Ministry of Trade and Labor, State of Israel, *The Chemical Industry in Israel, A Macro Overview*, URL <<http://www.moit.gov.il/NR/exeres/9A4F2505-80AB-4AC0-9075-D44B555C6014.htm>>

¹⁶⁰ Israel Chemicals Ltd. (ICL), URL <<http://www.israelchemicals.co.il/>>

¹⁶¹ Oil Refineries Ltd., URL <<http://www.orl.co.il/>>

¹⁶² The Energy Information Administration, U.S. Department of Energy, *Country Analysis Briefs; Israel*, April 2004.

¹⁶³ Makhteshim-Agan Industries Ltd., URL <<http://www.main.co.il/>>

chemicals, detergent and explosives additives and pharmaceutical intermediates. The Negev Peroxide, a subsidiary of Makhteshim Chemical Works Ltd., produces hydrogen peroxide for various industrial usages.

In the year 2000, the Israeli government launched a program to develop a national strategy for the biotechnology sector. The main challenge identified for the growth of the sector was to enable the technology transfer from basic research to the industry. The Office of the Chief Scientist at the Ministry of Industry and Trade is responsible for the policy regarding the support of industrial research and development; \$430 Million is spent each year on different support programs.¹⁶⁴

Israel is among the twelve nations in the world that have the highest number of biotech companies.¹⁶⁵ There are around 160 biotech companies in Israel and they work both with biotechnology issues for human health as well as for the agricultural area. The companies are involved in a variety of activities. Five key segments can be identified: Biotherapeutics, Platforms for Drug Research, Diagnostics, Laboratory Tools, and Agro-biotech and Food. The biotech industries are often supported by cooperating academic facilities, research institutions and industries working with for instance electronics.

Transfer of Science to Industrial Technology

Technology transfer companies are established at most of the Israeli universities and Israel has also established a very ambitious “Technological incubators program” to funnel high-tech research efforts and business ideas into commercial viable companies.¹⁶⁶

The technological incubators are managed by professionals from the industry, business and science sectors and provide the entrepreneurs with physical premises, financial resources and professional and administrative assistance. The program was established between 1990 and 1993 and by June 2004 the 24 incubators had supported over 1,000 projects of which 45 percent had continued outside the incubators.¹⁶⁷

Another factor that has had a significant positive influence on the Israeli development towards a high-tech nation over the last 15 years is the immigration by highly trained professionals from the former Soviet Union and other East European countries. According to a Science article more than 13,000 scientists from the former Soviet Union, among nearly one million ex-Soviet immigrants, arrived in Israel between 1989 and 1999.¹⁶⁸

The integration, in general, of the new immigrants into the Israeli society has not been without problems and this situation has also been reflected when it comes to scientists. Several programs were established in Israel to help at least some of the newcomers into the universities. There were, however, a lot more highly trained immigrants entering Israel than

¹⁶⁴ Office of the Chief Scientist, Ministry of Industry and Trade, Tel Aviv, *Israel Bio-Plan 2000-2010*.

¹⁶⁵ The Israel Export and International Cooperation Institute, URL
<http://www.export.gov.il/Eng/_Articles/Article.asp?CategoryID=487&ArticleID=606>,
<http://www.export.gov.il/Eng/_Uploads/606Biotechnology_Briefing_2003b.pdf>

¹⁶⁶ Office of the Chief Scientist, Ministry of Industry and Trade, Tel Aviv, *Technological incubators in Israel*, URL <<http://www.incubators.org.il>>

¹⁶⁷ *ibid.*

¹⁶⁸ Stone R, ‘Israel Hits Rich Seam in Ex-Soviet Immigrants’, *Science*, vol. 284, issue 5416, 1999, pp. 892-897.

could be absorbed by academia and a lot of people were pushed towards the private research sector. With the help from, among other things, the above-mentioned “technological incubators” many of these immigrants have played an important part in the Israeli development into a high-tech industrial nation during the last decades.

Although Russia’s traditional strength in physical and theoretical science has spurred the Israeli scientific strength in those disciplines, the immigrants seem to have had lesser impact on most of the life science disciplines.¹⁶⁹

Israel has signed a number of bilateral R&D cooperation agreements to encourage joint ventures in R&D, manufacturing and marketing as well as cooperation in academia. Several of the major programs are at least partly funded with U.S. capital, e.g. U.S.-Israel Binational Science Foundation¹⁷⁰ and U.S.-Israel Binational Industrial Research and Development Foundation (BIRD)¹⁷¹. There are also bilateral programs associated with several European and Asian countries and Israel is also involved with the EU EUREKA network and Sixth Framework programs.¹⁷²

Many of those bilateral agreements are associated with research funds that require collaborative projects between researchers or companies from the countries that support them. As an example BIRD, established in 1977, sponsor projects in the range of \$0.5 to \$1.0 million over two to three years and where the total project cost for the two companies involved is at least twice the funding received from BIRD. BIRD also funds smaller projects over a shorter time period. Up to 35 full-scale projects and 20 smaller projects may be approved each year.

¹⁶⁹ *ibid.*

¹⁷⁰ U.S.-Israel Binational Science Foundation, URL <<http://www.bsf.org.il/Gateway3/>>

¹⁷¹ U.S.-Israel Binational Industrial Research and Development Foundation, <URL, <http://www.birdf.com/>>

¹⁷² *ibid.*

The 1979 Nuclear Test

When the Comprehensive Test Ban Treaty (CTBT) was opened for signature in 1996, many states signed the treaty on the first day, September 24. With Israel's opposition to the NPT in mind, it was somewhat surprising to find that Israel already the following day also chose to be among the signatories. Signatories to the CTBT promise not to perform any tests leading to nuclear explosions. The Israeli nuclear establishment must have been very confident in their own capability since they chose to abstain from any future testing. A relevant question that arises is: Has Israel tested their nuclear devices in the past?

It would not have been too surprising to find suspicious Israeli nuclear activity around 1970 when the security of the State of Israel was still in jeopardy. An Israeli test around that time would seem logical. By then, Israel had a number of nuclear devices in stock and perhaps a need to verify that their construction worked. The lack of tests at the time implies that Israel received enough information from the early collaboration with France to completely rely upon their construction. The Yom-Kippur War might have served as a wake-up call for Israel. In desperation over a serious situation in the war with heavy losses of Phantom jets, Israel signalled to the U.S. by making preparations to launch a nuclear weapon. The message reached the U.S., who started a massive airlift "Operation Nickel Grass" to resupply Israel with conventional weapons. The aid helped Israel to regain control and the nuclear threat was averted.

With no guarantee that the situation would not to be repeated in the future, Israel might have gone on to test if their last way out would function, but it did not. Instead, it is claimed that Israel did test several years later, on the 22 September 1979. Seymour M. Hersh has gone to great depth in trying to resolve the rumours around this possible test in his book "The Samson Option".¹⁷³ The story as told by Hersh, was that Israel did three tests with low-yield artillery shells in the Indian Ocean near South Africa's Prince Edward Island, some 2400 km southeast of the Cape of Good Hope. The first two tests were conducted with a cloud-covered sky and took place unnoticed. When the third test was performed the sky broke and an aging American VELA satellite spotted the distinctive flash from a detonating nuclear device. On 41 previous occasions the aging VELA satellite had spotted similar flashes. Each time it could be connected to a French nuclear detonation in the Pacific or a Chinese test at Lop Nor.

This time, the verdict from the outside panel, the U.S. Administration had set up to investigate the data received, was "no test". President Carter, then seeking re-election, did not want a nuclear embarrassment – an Israeli atmospheric test would for one thing have meant a breach on the 1963 Partial Test Ban Treaty. More important was that Carter's success with the Egypt-Israeli peace negotiations at Camp David would have counted little if it had been revealed that one of the peace partners more or less simultaneously had conducted a nuclear test. To avoid that humiliation, it was decided to engage an outside panel, led by Jack P. Ruina from the Massachusetts Institute of Technology,¹⁷⁴ to perform a technical study on the

¹⁷³ Hersh SM., Chapters 19 'The Carter Malaise' and 20 'An Israeli Test', in *The Samson Option*, (Random House: New York, 1991). pp. 259-283.

¹⁷⁴ Jack P. Ruina is a professor emeritus at the Massachusetts Institute of Technology where he has taught since 1963. Previous to that he served for four years in the Defense Department. During that time he was director of the Advanced Research Projects Agency (ARPA) from 1961 to 1963. Prof. Ruina has also served on several government advisory committees.

VELA satellite data. Any political interpretation, like who? or why?, was omitted from the study. In July 1980, the panel concluded that “the flash was probably not from a nuclear explosion” and that it could have been “a consequence of the impact of a small meteoroid on the satellite”.¹⁷⁵ The panel’s verdict was unanimous, but controversial. Harold M. Agnew, a member of the U.S. Nuclear Intelligence Panel and the director of Los Alamos between 1970 and 1979, later commented: “If it looks like a duck, it’s got to be a duck.” “But that wasn’t an answer Carter liked.” In his opinion, the question to ask was: “Who did it?”¹⁷⁶

A low-yield nuclear explosion would have caused a limited amount of nuclear fallout that on contact with the ocean rapidly would have been diluted. Although airborne measurements were initiated by the U.S. already three days after the VELA alarm was received and continued for three weeks, no radioactive debris could be found.¹⁷⁷ Some short-lived radionuclides were detected in New Zealand rainwater samples collected during the period between August 1 and October 28. The measured activities were very low,¹⁷⁸ and far from being “a smoking gun”. The absence of accompanying airborne radioactivity was probably crucial for the Ruina panel’s verdict.

Other studies on the 22 September 1979 event have come to a different conclusion than the Ruina panel. In a previously classified report from December 1979,¹⁷⁹ Mission Research Corporation already in the introduction states that “Subjectively, all possible sources but one [a nuclear detonation] seem very improbable to us.” In May 1980, Sandia National Laboratories issued a report¹⁸⁰ on the analysis of the signals received by the detectors on the VELA satellite. The conclusion is that after the detected signals have been corrected for background modulation effects, they “are fully consistent with those expected from a low yield atmospheric NUDET” [nuclear detonation]. In 1981, an independent Los Alamos panel went through the VELA data again.¹⁸¹ The report was unclassified in 2001, but is so heavily redacted that straight-forward conclusions cannot be made from it. However, Los Alamos scientist Dave Simons in 1997 said that: “The whole federal laboratory community came to the conclusion that the data indicated a bomb”. “But in the administration’s view, because the evidence was weak, they took exception to the information and our analysis.” “It was unsettling because we were quite thoroughly convinced of our interpretation.”¹⁸² The CIA was also convinced a test of a small (2-3 kilotons) nuclear weapon had taken place.¹⁸³ In an article in the Albuquerque Journal, Simons showed some sympathy for the Ruina panel’s verdict and confessed that: “Even we felt the United States would be putting itself in an awkward

¹⁷⁵ Executive Office of the President, Office of Science and Technology Policy, ‘Ad Hoc Panel Report on the September 22 Event’, 1980.

¹⁷⁶ Hersh SM, *The Samson Option*, (Random House Inc.: New York, 1991), p. 280.

¹⁷⁷ Mauth GH, ‘Alert 747 (U)’, Sandia National Laboratories, Albuquerque, 1980.

¹⁷⁸ O’Toole T, ‘Fallout studied to confirm blast near S. Africa’, *Washington Post*, 14 Nov. 1979.

¹⁷⁹ Sappenfield DS, Sowle DH, McCarty TH, ‘Possible origins of event 747 optical data (U)’, Mission Research Corporation, Dec. 1979.

¹⁸⁰ Mauth GH, ‘Alert 747 (U)’, Sandia National Laboratories, Albuquerque, 1980.

¹⁸¹ Jones EM, Whitaker RW, Horak HG, and Kodis JW, ‘Low Yield Nuclear Explosion Calculations: The 9/22/79 Vela Signal (U)’, LA-9062, Los Alamos, 1982.

¹⁸² DeLucas K (LANL Press Release), ‘Blast from the past: Los Alamos scientists receive vindication’, Los Alamos National Laboratory, 11 July 1997.

¹⁸³ Wisconsin Project on Nuclear Arms Control, ‘Israel’s Nuclear Weapon Capability: An Overview’, *The Risk Report*, vol. 2 No. 4, 1996.

position. To stand up and force some kind of political sanctions with that kind of data would have been very difficult."¹⁸⁴

In 1979, South Africa's nuclear program was well on its way and Hersh claims that South Africa at least knew about and observed the test, if not directly taking part in it. If this description is correct, surely someone would have stepped forward at the time the South African nuclear program was dismantled and told the story of the 22 September 1979 event, but no-one did. Given the total secrecy, in which Israel has shrouded its nuclear program, it is logical that no Israeli has stepped forward, but if South Africans observed the test one would think that the lid would have come off by now.

The timing of a possible 1979 test from the view of the peace accord with Egypt seems to an outside viewer highly implausible, so what could possibly have led Israel to conduct a test at that time? One reason could have been Saddam Hussein's nuclear activities in Iraq. With a future nuclear-armed Iraq in Israel's mind, a test of tactical nuclear weapons like artillery shells or primary devices for a thermonuclear weapon does not appear too farfetched.

In conclusion, the evidence points to the fact that a clandestine Israeli test did take place in the Indian Ocean in 1979 without the involvement of any other state.

¹⁸⁴ Albright D, Gay C, 'Proliferation: A flash from the past', *Bulletin of the Atomic Scientists* vol. 53, No. 6, 1997.

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