CHAPTER - 5

PROLIFERATION AROUND THE MEDITERRANEAN
AND BEYOND

Though the past chapters have extensively reviewed the threat to NATO, it is as well to narrow them down and clarify it further. Undoubtedly the threat of "missile proliferation" is a "catch all phrase" that does not explain whether for instance, a state that is party to all the non proliferation regimes would also come into the threat envelope. Would a state selling such technology constitute a threat? Would a state outside these regimes, but pursuing its own independent deterrent but strict in its own non proliferation agenda be considered a "rogue".

According to the Alliance Policy Framework on Proliferation of Weapons of Mass Destruction¹, the proliferation challenge is characterized by

a) States anywhere that have not complied with or even willfully disregarded their international non-proliferation commitments.

b) States in the periphery of the alliance who attempt to develop or acquire such a capability

c) Proliferators anywhere who might seek profit or gain political benefit by selling WMD

Thus it appears that any country with a WMD programme or any country that seeks to sell or transfer such technology is a proliferation risk. Sometimes NATO communiqués point out a specific threat – as North Korea and Iraq – both of which are mentioned in the Policy Framework. The threat from an unsanctioned use of Russia's nuclear weapons is another threat that is often outlined. While official documents never refer to China in terms that may seem hostile, the proliferation tendencies of China are clearly a cause for concern. Analysts also refer to the “danger” of a Russia–China alliance in case of NATO expansion, and warn that “The period of transition from one great power system leader to another is marked by a tremendous potential for instability and conflict, ...” China is acknowledged as a power to contend with, and it is worth noting here that even the first ABM Defence over the US, (Grand Forks) had China in mind when it was planned. Similarly, it is known that US weapons are targeted at China since the time China became a nuclear power.

As to translating this into a specific military scenario it appears that proliferation would need to be countered by military means in the following scenarios.

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4 This outline is given by Joachim Krause, “Proliferation Risks and the Strategic Relevance: What Role for NATO?” Survival, Vol. 37, No.2, pp. 135-48. These perceptions have been outlined also in all the military doctrines that have been examined in the past chapters.
A military threat would be faced if opponents were armed with WMD and ballistic missiles in areas where NATO troops were involved with peacekeeping/enforcement with or without a UN mandate.

A military threat might involve a direct threat to Alliance territory in "retaliation" of a given NATO action, or as a threat to deter such action.

NATO interests may be threatened by shifts in regional power balances due to acquisition of WMD and missiles.

Regional instabilities involving conflict and use of WMD may indirectly affect NATO member states' security.

In both the political and military presentation of the threat, the "centre of gravity" so to speak is clearly around the use or acquisition of WMD, and secondly, on any action that would impede or threaten NATO forces, or that of its allies, and thirdly, any action contrary to the mandate of the UN. But the actual parameters of what constitutes WMD has been progressively increased. In an earlier period, it was understood that WMD essentially constituted nuclear weapons, since they alone had the reach and the destructiveness that allowed its classification as a WMD. Chemical weapons and biological weapons have only been recently been referred to as WMD weapons in their own right, and as brought out in previous chapters, the US has been in the lead in expanding the role of US nuclear weapons to take care of the chemical weapons threat. This example has been followed by other allied countries, though not in such specific terms.

However it is as well to note that the chemical and biological weapons threat has severe limitations in respect of the ability of developing nations to actually operationalise these capabilities. These limitations are
outlined by the OTA (Office of Technology Assessments) which clearly notes that "without very sophisticated technology, ballistic missiles are not well suited for delivering chemical or biological weapons to broad area targets. Such targets are most effectively covered with an aerosol spray delivered at slow speeds and low altitudes upwind from the target, a delivery profile much better suited to cruise missile or aircraft." It however also noted that by the 1960's the US had developed such a capability by means of effective sub munitions. Given that it is precisely this period of technology that is at present in the arsenals of developing states therefore the possibility is not rule out. Therefore the emphasis increasingly in western doctrines is on chemical or biological weapons, which are now not always called "Weapons of mass destruction" (since they are clearly not even area weapons) but those that are deemed to be dangerous to troops, or civilian populations in the event of a terrorist attack. However given that the MTCR now covers missiles capable of delivering chemical and biological weapons, (that is missiles with payloads well below the previous 500kg threshold) it seems to imply that the threat is still seen as serious enough. Therefore the following chapters assess the capabilities of countries who fall in any of the brackets mentioned above, and as such includes their proliferation activities.

It is hardly necessary to point out that the area around the Mediterranean constitutes the "first circle" of European concerns. While in

the earlier period (1970-1980) the concerns were with neighbouring countries like Algeria, and Egypt, the emergence of longer range missiles and reported programmes for staged missiles means that the "threat net" had to be thrown wider. Thus typically, a study on a threat to Europe includes Iran, Iraq, and Syria, but rarely (if ever) is Israel mentioned. As the one nuclear power and a proliferator besides. Israel fulfils at least two of the criteria laid down by the Framework. The impediment to this classification is that Israel owes much to US and European assistance in developing her nuclear and missile capabilities. Israel undoubtedly has the largest missile force in the region, which itself is a prod to the region to enter into a missile race. As long as Israelis have their weapons, the Arabs are going to continue to try to get their own.

While Israeli capability is largely indigenous, the missile programmes around her, remain heavily dependant on foreign suppliers. This chapter looks at the capabilities induced by inputs from the major "proliferators" examined in the previous chapters, and the relative weaknesses the strengths of the recipients.

ISRAEL

Israeli nuclear weapons capability was at the very least acquiesced by the west, if not covertly assisted. For instance analysts note "Although some facts are lacking, circumstantial evidence overwhelmingly indicates that France and West Germany acquiesced in Israeli piracy of uranium from Europe. The Us had suppressed information about the loss of
weapons grade uranium from the Nuclear Material and Equipment Corporation... \(^6\). France had a particularly close and covert relationship with Israel, and from 1953 onwards there were technical exchanges between the two. Assistance by Israel in heavy water production was crucial to France – now targeted by UN non proliferation policy. For Israel, the French input served to reduce a feeling of “isolation” brought on by the moves towards a Baghdad Pact, and US preoccupation with the northern tier defence against the Soviet Union. This relationship became closer after the 1956 Suez War, since both countries were disappointed in the American inaction following the Soviet threat to use nuclear weapons, as well as US hostility against the whole operation. It was in these circumstances that the French agreed to set up a reactor at Dimona in 1957, designed to produce plutonium and given the Israelis the military option. Though the program was greatly embarrassed by US “exposure” nonetheless analysts note that French assistance in the form of resources like Uranium, carried on through third parties (South Africa, Niger, Gabon and Central African Republic).

The criticality of the nuclear programme was apparent in the fact that Israel was even willing to co-opt West Germany in her search for technology and material. In 1958, the Max Planck Institute set up a joint committee to decide on coordinated research programmes, which allowed

\(^6\) Dr Christopher Raj “Israel and Nuclear Weapons” in K. Subramanyam (ed.) *Nuclear Myths and Realities* (New Delhi: ABC Publishing House, 1981)
dozens of Israelis to go to West Germany and study nuclear physics. Israelis are also reported to have exchanged laser enrichment technology with West Germany, in return for 200 tons of uranium in an operation where the ship was “hijacked” by Israeli commandos.

Similarly a detailed account narrates Eisenhower’s decision to provide Israel in all possible assistance in developing an atomic weapon – which was provided by the CIA in 1957 and 1958. Further down the line, the US first provided Israelis with the most sophisticated delivery vehicles like the F-4E Phantom, and later nuclear capable Lance short range missiles

Israeli missile programmes are said to have started somewhere in the late 1950’s and a decade later the first sounding rocket was produced. French assistance was once again crucial in the Jericho program where the French company Avions Marcel Dassault contracted to supply 25 missiles worth $100million as well as technology for a strap down inertial navigation system. The delivery of the missiles is impossible to verify, but a test may have taken place during the late 1960’s. A Jericho force may have been deployed in the early 1970’s with a range of 400-450 km. This cooperation grew out of a US refusal to supply the Perishing-I to Israel, even as France had pulled out of NATO.

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7 Ibid.p.113
8 Ibid.p.111
9 Martin Navias , "Going Ballistic: The Build up of Missile in the Middle East", (New York: Brassey’s, 1993), p.112.
The Jericho-II was tested in 1987 (that is, fully a decade or more after a development decision) This solid fuelled, two stage missile traveled 800km showing a considerable jump in capability. Maximum range was estimated to be 900km. In 1989 a Jericho follow on was tested with a range of nearly 1,500km\(^{10}\)

Israel also had a vibrant space programme. The Ofek satellite was launched by a three stage solid fuelled Shavit (Comet) Subsequently the Israelis have successfully launched a series of satellites establishing herself not only as a space power, but also as one with potential ICBM capabilities.

As noted earlier, Israel was as much proliferant as recipient. It is understood to have had close links with the South Africans, especially after the removal of the Shah in Iran. A missile test was reportedly conducted in July 1989 bore a marked resemblance to the Jericho. “Sting” operations carried out by US customs had led to the uncovering of an attempt to export gyroscopes, though a non existent Israeli firm. Another report noted joint South African-Israeli tests of the Barak naval anti missile systems off Natal in August 1991\(^{11}\). This assisting of an embargoed country has been denied by the Israelis, though this was one of the reasons why the American were keen on forcing Jerusalem into joining the MTCR.

\(^{10}\) These ranges are contested with Geoffrey Kemp putting them as 640km, 1450km and 2,400km respectively. See *The Control of Missiles in the Middle East* (Carnegie Endowment for International Peace, Washington, 1991).

(According to the *Financial Times* Israel may have sold missile technology to the Iraqis as well though there is no confirmation of this.\textsuperscript{12}

More serious is the charge that Israeli often bartered sensitive information with China, or else sold it high technology. Like South Africa, China had limited access to high technology. Analysts cite a repot which noted that Israel had singed a contract worth a few hundred million dollars to provide China with sophisticated warheads for missiles. (this was a period when China was experimenting with new IRBM's in the "M"series) This is confirmed by Hua Di, who claimed that Israelis had transferred missile guidance data to China\textsuperscript{13}. In March 1992, the Auditor General of the US State Department issued a report asserting that a "major recipient “ of American aid had illegally transferred weapons with American components to third parties including China\textsuperscript{14}. Rumours also circulated that the Israelis had traded sensitive technology to the Chinese in return for a complete run down on the Saudi Arabian CSS-2, as well as rendered assistance to the Taiwan programme. This could have included plans for LANCE missile which were used in Taiwan's attempt to build the 100km *Ching Feng* missile.\textsuperscript{15} The Israelis are also alleged to have sold Patriot missile technology to China , with a Rand Corporation Study noting that Israel was


\textsuperscript{13} This is cited by Gerald M. Steinberg, "Israel: Case study for International Missile Trade and Non Proliferation" William Potter & Harold Jencks (eds.) "The International Missile Bazaar" ( Boulder : Westview, 1994).p.243.

\textsuperscript{14} Ibid. It must be noted that any report on Israel are scrutinized and declared as lacking evidence, while in assessing the programmes of other countries, no such caution is used.

China's leading supplier of advanced technology\textsuperscript{16}. The suspicion that this was again with US agreement was furthered when National Security Advisor Brent Scowcroft was reported to have instructed the DoD's chief spokesman not to talk about the issue. Another US official was reported as saying that the Israel's had a bad track record on arms transfers and that they had sold weapons containing US supplied part to Taiwan, Chile, South Africa and China. He also noted that a previous sale to China included "small" missiles, but refused to provide details\textsuperscript{17}.

On 13 July 1998, Israel admitted for the first time that it possessed nuclear weapons capabilities. Prime Minister Peres states that Israel "built a nuclear option not in order to have a Hiroshima but an Oslo\textsuperscript{18}. The review of the Israeli nuclear doctrine appears to have begun in June 1998, led by David Ivry, a former commander in the Israeli Air Force and Director General of the Ministry of Defence. Ivry noted that Israel needed a second strike capability ( and the doctrine of mutual assured destruction of the cold war as a model for Israel\textsuperscript{19}. The review prompted a relatively unusual airing of views by members of the Government. The Defence Minister indicated that though the policy would have to be overhauled and modernised for the new environment, the basic policy of ambiguity would not change. Members of the Knesset , especially the chairman of the subcommittee on

\textsuperscript{16} This is cited in John Lancaster and Barton Gellman " US Investigating Reported Israeli Sales of Patriot Missiles to China". \textit{Washington Post} , 13 March 1992. See http://www.tech.mit.edu

\textsuperscript{17} Ibid.

\textsuperscript{18} "Peres admits to nuclear capability", \textit{Israel Wire}, July 14, 1998.

defense asserted that Israel must invest several billion dollars in developing an assured second strike or preemptive strike capability. Noting that deterrence created by nuclear ambiguity would not work anymore\textsuperscript{20}. Clearly, an openly nuclear Israel would push neighbours into adopting open biological or chemical weaponization. Israel's defense analysts are also debating how Israel should respond to a chemical or biological weapons attack. Some were of the opinion that Israel should be prepared to use any weapons – including nuclear – if it suffered a CBW attack. He also noted that unlike South Asia, Israel would not go openly nuclear since then the United States would be obligated to cease all cooperation with the country\textsuperscript{21}

A relatively new input into Middle Eastern proliferation is that of the entry of missile defense systems in the area. In July 1988. The Israeli Ministry of Defense and the US SDIO had signed an agreement on the joint development of the ARROW (or as it is known in Israel, the Chetz). The US contributed 80\% for the first sate of the programme, which has now been completed. The second stage, (the so called ACES – Arrow Continuation Experiments Programme) was funded at 72 per cent, and the next phase will decide on production and deployment. The US reviews its participation at the end of every stage\textsuperscript{22}.


\textsuperscript{21} Shai Feldman," The Nuclear Test in South Asia: Implications for the Middle East" \textit{Strategic Assessment} 1(July 1998), \url{http://www/tau.ac.il}

\textsuperscript{22} Navias, note 9.p.176.
Interestingly, the ARROW unlike its American counterparts is designed with an interceptor travelling a Mach9 (as compared to Mach 3 of the Patriot), covering an area of around 100 kilometers and intercepting missiles at roughly 80 kilometers (compared to the maximum of 18 for Patriot) so that contact with a chemical or biological warhead can be made outside Israeli territory. Support for missile defences is hardly uniform, considering that it would cost Israel at least $0.9 billion for 1200 missile system that would be (theoretically) be able to defend Israel. Moreover, some analysts are of the opinion that defenses would degrade Israeli deterrent posture. All this activity had its inevitable fall out on the region. Even as Iraq subsided under the most stringent sanctions and verification regime in the history of the nation state, Iran was equipping herself with ballistic missiles.

IRAN

Iran' s missile program started under the pressure of war, with tall claims of development often conflicting with actual fact. For instance claims of mass producing the Scuds was proved to be untrue, with only the short range Ohgaab (a modified Chinese Type –83 rocket) actually being made within the country. Iran also sought to develop the Iran –130 but faced severe guidance problems. During the war, Iran fielded the Scud –B, and the HY-2 Silkworm as well as a range of short range missiles (the Mushak

23 The author is apparently presenting an Air Force view, and one incidentally that is common to almost all Air forces in the world – who dislike seeing the steady encroachment of their own role by missiles. Ibid. P.178.
family) which were not more than artillery rockets. Initially at least, all programmes were designed for the short term objective of defeating Iraq. Teheran is now striving for longer ranges possibly to hit Saudi Arabia and Israel and has moved from short range to the “strategic” range of 1,000km.

Iran is reported to have an extensive infrastructure in missile industry. The organization includes the Department 140 (the Sanam industrial group) which is the principal administrative entity responsible for management of science and research centres and production centres. In 1989 the Wahid-e-Mashacheh missile division of the Islamic Revolutionary Guards Corps was responsible for the missile program. Later the Ministry of defense acquisitions and logistics was responsible for production facilities which was united under the Defense Industry Organization. Parchin is understood to be the centre of DIO chemical industry (explosives, fuels etc) and may also be the original producer of short range missiles. A big facility near Isfahan is the IRGC missile support facility, and where the DIO had established a science and defense industries academy. Military complexes are said to house both Korean and Iranian engineers. The missile test range is at Rafsajan, while Quam was the site of a test launch of a Scud – B. Other facilities include Instrumentation Factories Plant which appears to be the main body for transactions all over the world. There appears to be no centralized control over Iranian

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24 Entities which report to the department 140 are reported to be Department 140/14 (The Shahid Bagheri industrial production group – solid propellant missile development). Department 140/15 - liquid propellant missile development. Department 140/16 – instrumentation, production planning, control and guidance systems. Department 140/31 - The Parchin missile industrial production group.
acquisitions abroad. Supplier ship their orders to the site 50 km east of Teheran near the Parchin weapons plant, which appears to be the site for a new guidance and control manufacturing plant. Overall Iran is said to use the following methods to acquire materials for its missile production

- False end user certificates
- False descriptions of products in official documents
- Agent services
- Transit through third party countries.
- It has also had considerable legitimate assistance from various countries North Korea, China and later Russia

In the Russian assessment Iran has the necessary machinery for metal works and production equipment, for the production of propellants. However it lacks control and guidance systems technology. Other sources also note that Iran is not likely in the near term to be able to produce indigenously nuclear warheads for any of its missiles or strike aircraft. Iran had developed a chemical warfare capacity in response to the Iraqi attack, but whether it can weaponize these in terms of warheads is still unclear. Reports of biological weapons production remain unconfirmed. That it has received considerable assistance from primarily China, North Korea and later Russia is however apparent.

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25 In an interview with a Russian scholar. 26 June 1997.
27 This analysis is from John Pike, Federation of American Scientists, http://www.fas.org
North Korean assistance began possibly began in the mid 1980's when it is believed to have set up a plant in Iran for the assembly of North Korean Scud –B missiles (300km) also known as the Shahab-1 and Scud –C (500km/700kg) known as Shahab-2. At the early phases of implementation of these deals the Iranian probably only learnt to simply assemble the kits provided. North Korean assistance was vital during the war, since Iran was able to buy 90-100 Scud-B's off the shelf for $5 million, and later to produced the improved version , the Scud – mod B which had an improved range of 320km with a 1000 kg warhead. Other sources note that North Korea also undertook to supply the Silkworms which were transshipped from China.

Iran is reported to have paid $500 million for the development of the "No-dong" missiles, after an Iranian delegation assigned a contract in Spring 1993 for a deal that is assumed to have covered production technology. At the end of 1993 some sources reported that this agreement was cancelled. This is further supported by analysts (see below) who contest the allegation that the missile that Iran eventually tested to everyone's consternation, is a Nodong.

On September 18, 1997 the Assistance Secretary of State for Near Eastern Affairs Martin Indyk testified that Iran could complete development

30 Kontrol Digest. Note. 25.
of the Shahab-3, identified as the Nodong-1 within 12-18 months\textsuperscript{31}. The assessment of the launch dates proved accurate, with the Shahab-3 making its appearance in 22\textsuperscript{nd} July 1998, though whether it was indeed the Nodong-1 is open to doubt. The details given by the Iranians provides the information that the Shahb-3 was an MRBM 53 feet (16m) in length, and is capable of carrying a one ton warhead at an altitude of 155 miles above sea level\textsuperscript{32}. The source also noted that it was an accurate weapon, though this again can hardly be verified. Israeli press reports quoting intelligence sources said that at least a dozen such missiles had been delivered. But US sources then noted that the attempt had failed for financial reasons. Whether these missiles were then manufactured within the country is not known. In this context it is worth noting Navias claims that the 1993 agreement also covered the development of nuclear warheads.\textsuperscript{33}

However it is Chinese assistance that has been crucial. The CIA reported that China had delivered hundred of missile guidance systems and computerized machine tools to Iran sometime between mid 1994 and mid 1995.\textsuperscript{34} These components, it said, could improve the accuracy of North Korean supplied Scuds and enable it to build more on it's own. The Arms Control and Disarmament Agency Director John Holum was quoted


\textsuperscript{32} General Mohammed Bagher Qualibaf, head of the Islamic Revolutionary Guards Air Wing, on CNN, 2 August 1998, on line at www.cnn.com

\textsuperscript{33} The Agreement signed in September 1989 however only mentions "exchanges of military exercise and cooperation experience and on military scientific information". Navias however opines that it concerned far closer cooperation. See Navias. Note 4.

as advising sanctions. In November 1996, a another CIA report said that China Precision Engineering Institute had agreed to sell Iran's Defense Industries Organization gyroscopes, accelerometers, and test equipment, for building and testing missile guidance components. The next year found more "leaks" from Pentagon intelligence sources, alleging that Iran was building a new short range ballistic missile, with Chinese assistance. The joint programme was reported to involve the development of the NP-110 solid propellant missile with a range of 105 miles. According to the Times "Iranian missile technicians traveled to China (in May 1997) to watch a ground test of a 450mm diameters rocket motor to be used in the NP-110". In addition China was said to have agreed to sell Iran X-Ray equipment to study missile casing an to check for defects in the solid propellants, besides supplying telemetry equipment for missile guidance data collection during flight tests of the Shahab-3 and Shahab-4. It was also reported that over a 100 Chinese and North Korean experts were working there.

The possibility that the Shahab-3 is a Chinese DF-25 with modifications is mentioned by Karp, who notes that the missile follows no other Russian or Chinese design. The closest apart from the above are the

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37 CRS Report note. 53.
SS-23's which were eliminated under the INF Treaty. However Bulgaria and Slovakia are known to possess some of these.\textsuperscript{38}

The \textit{Shahab} –4 appears to be a liquid fuelled missile, based on or copied from a 1950's design of the SS-4. (R-12) which was a major actor in the Cuban missile crises. (It was banned as well under the INF). This was a cumbersome missile requiring over 20 vehicles to transport and launch, and its acquisition could simply be part of the learning curve that seeks small steps to an indigenous capability. Karp also notes that Iran remains more of a “dabbler” in missilery – going forward in fits and starts depending on what it is able to access, rather than a determined proliferator who carries on with a consistent indigenous and foreign back up programme with specific ends in mind. Interestingly he notes that a crude “stove –pipe” weapons could be deployed within two years as the Shahab-4 ; A minimally reliable weapon based on approximately 6 tests of more could be deployed in about 5 years, while a highly reliable weapon could require at least 12 flight tests, and approximately eight years to develop and deploy. Karp also makes the point that the Shahab-3 being a solid fuelled missile would need less tests, and could be reliably ready soon - if sufficient foreign assistance and a solid fuel motor of suitable diameter can be mastered.\textsuperscript{39} Thus there is a considerable gap between the assessments of US government sources, and those of analysts, with the


\textsuperscript{39} Ibid.p.21.
former seeing Iran as capable of producing missilery on its own, while analysts are sceptical about such claims.

Much has already been written and conjectured about Iran’s nuclear capabilities to further repeat it here. At present Iran has no independent source for fissile material. The *Proliferation: Threat and Response*\(^{40}\) notes that the shortest route for Iran would be to steal or buy fissile material or weapons outright. Alternatively Iran could pursue a long term development of the entire fuel cycle, which would allow production of plutonium at some future date.

Apart from this were allegations of Chinese nuclear co-operation with Iran, and that of chemical and biological sales including a complete factory suitable for making chemical weapons. According to the *Wall Street Journal*, Iran has the largest CW stockpile in the Third World\(^{41}\). In 1996, a Defense Department study also noted that Iran had a large BW program which had begun in the 1980’s\(^{42}\) . The CIA notes that Iran is capable of manufacturing vesicants like mustard gas, and blood gases like hydrogen cyanide, phosgene, and chlorine gas. It is suspected of having at least two research and production facilities capable of manufacturing both mustard and nerve gases, including V-agents. According to one source, Iran is capable of manufacturing up to 5 tons of chemical weapons a month\(^{43}\).

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\(^{42}\) “Proliferation : Threat and Response" Department of Defense Publications, April 1996.

Assuming this to be correct, one may infer that the present capability of the Iranians comes to roughly 440 tons.

Less known or written about is Iran's cruise missile programme which is being adapted from the Silkworm and the Styx both of which are said to be easily reverse engineered to provide longer ranges. However, so far there is no evidence of any developing country managing these feats to provide itself an indigenous land attack cruise capability, not even China. Western experts believe that the limited range of 80km can be extended to perhaps 400km, while Karp cautions that this would be possible assuming that Iran had the best recourse to dual use goods and human resources.

A new (or recycled) actor in the Iranian missile program is Russia. US officials learnt of what seemed to be an unusually close cooperation, from the Israelis. Israeli General Amos Gilad, director or research for Israeli military intelligence visited Washington just days before Russian Prime Minister Chernomyrdin was to meet with Vice President Gore on February 6. The Israelis briefed the area desks at the State department and the various intelligence agencies, that the Russians were selling the SS-4, a 1,250 range missile capable of carrying a 4,400 pound warhead to the Iranians. (This incident happened not more than a week after the White House announced its agreement with President Yeltsin over demarcation

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issues of the ABM Treaty of 1972 creating some doubt as to the timing of
the revelation.) This is said to be the Shahab-4 with a range of 2,000 km
and a payload of 1,000 km. Israeli sources say that this could be ready by
2001. Israeli sources also reportedly told Defense News that the long-
term goal of Iran is to develop missile with range of 4,500 and 10,000 km.

What is interesting is that the transaction between Russia and Iran
was alleged to include detailed instructions on how to build the missiles and
guidance components. Some of the Russian companies have been
identified. One was NPT Trud which had been supplying (liquid fuelled)
rocket engines, the Polypus Research Institute which supplied guidance,
and the Central Aerodynamic Institute (TsAGI) which conducted wind
tunnel tests. TsAGI also was helping Iran to improve its infrastructure and
ability to design ballistic missiles. Later reports noted that nearly a dozen
contracts had been signed between February and July 1996 for assistance
with manufacture of a wind tunnel and sale of missile design software.
Other equipment sold including laser equipment, special mirrors, maraging
steel, tungsten graphite and high strength steel alloy bars for shaping into
missile casings, three types of alloy foil to shield guidance equipment in
missiles. Iranians are also reported to be studying rocket construction in
Russian Institutes (however this appears to be general engineering

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46 Jerusalem Post reported in Israel Line (internet) July 31, 1998.
47 Defense News October 6-12, 1997. Also see "The Proliferation Primer" International
Security, Proliferation, and Federal Services Subcommittee, United States Senate
48 Bill Gertz "Russia disregards pledge to curb Iran Missile Output" Washington Times,
Israelis note that the Russians were against any action at the time because Foreign Minister Kozyrev was directly involved in the deal.\textsuperscript{50}

Given the lack of human resources and the expertise at the top, Russian assistance in the long run may be the most crucial in creating educational centres for missile training. Two Russian institutions are reported to be heavily involved – the Bauman National Technical University in Moscow and the Baltic State Technical University in St Petersburgh. The latter is said to have established a joint missile education centre in Persepolis under the direction of the Sanam Industries group which directs the solid fuel programme. That these are in any way different from American University courses in technology is not clear.

It is apparent that foreign assistance has immensely helped Iran move faster along the road to a full fledged missile capability. However it appears to be still lacking in key areas – political and military clarity in missile programmes, poor human resources at the bottom of the pyramid, and restricted financial commitments. However, some key areas of Iranian lack – missile guidance, alloys, and engines – appears to have been accessed from Russia. It has progressed substantially from the manufacturing of small diameter solid motors (best used for artillery rockets) using double based fuels to the modern composite fuels better suited for large weapons.

\textsuperscript{50} Annie Eisele "Official Denies Russia Transfers Missile Technology to Iran" \textit{Defense News} September 15-21, 1997, p.8.
### Table 5.1

**Iranian Missile Capability**

<table>
<thead>
<tr>
<th>Missile</th>
<th>Range (km)</th>
<th>Warhead type (weight-kg)</th>
<th>Status</th>
<th>Source</th>
</tr>
</thead>
<tbody>
<tr>
<td>Scud -B</td>
<td>300km</td>
<td>HE/C 985</td>
<td>Operational</td>
<td>N.Korea</td>
</tr>
<tr>
<td><em>(Shahab-1)</em></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Scud- C</td>
<td>500 km</td>
<td>HE/C 500+</td>
<td>Operational</td>
<td>India/N.Korea</td>
</tr>
<tr>
<td><em>(Shahab-2)</em></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Shahab-3</td>
<td>1000 km</td>
<td>HE/C 1000kg</td>
<td>Tested</td>
<td>China/N.Korea</td>
</tr>
<tr>
<td>Shahab – 4</td>
<td>2,000km</td>
<td>HE/C/N? 1000kg</td>
<td>Development</td>
<td>Russia?</td>
</tr>
<tr>
<td>SS- 4 Mod</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

However, the assessment made by some, that Iran is now becoming self sufficient in technology, and could continue even if foreign aid was cut off is challenged by other analysts who note that while Iran’s missile Industries group has so far showed poor capabilities in the numerous prototypes of new artillery rockets (indeed it is now a world leader in the development of large artillery rockets) all of which betray poor design and exceptional redundancy. In liquid fuelled missiles, it is worth noting that in spite of the (reported) supply and setting up of a factory to produce its own Scud-C’s (from North Korean) there are no signs of production. The possibility that North Korea is no longer able to deliver materials, components and other resources (or is refusing to do so perhaps due to US/Chinese pressure) may mean that Iran would have to

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turn to an alternate source. This could explain her search for Russian help. There is clearly some division among analysts as to the exact benefits to Iran of a inconsistent and diverse sources of foreign technology. However, this budding capability is something that neighbours must take into account into their own security paradigms (as Israel clearly has). The immediate result was that Israel speeded up its ATBM project by one full year,

IRAQ

Though the country remains under sanctions, UN inspection, and under constant threat of bombing by an airborne policing force, analysts and governmental sources allege that Iraq has found new and novel ways of evading these strictures. One is to continue to hide stocks of chemical and biological weapons, and another has been to shift major segments of its missile program to states like Libya and Sudan. A Report to the House or Representatives details these two factors. Much of this report is based on an investigation of known Iraqi post Gulf war illegal acquisitions by the German intelligence, while yet more was accessed on the information of defectors from the Iraqi intelligence. Much of the report is however open to question. For instance the report notes that in early 1998, Iraq is said known to have possessed 48 Scud – type missiles and six launchers. Apart from this there is reportedly 600 tons of chemical that are sufficient for the

production of 200 tons of VX nerve gas\textsuperscript{53}. The UNSCOM report however, puts this only a “few”, noting that out of 819 Scud type missiles most had been accounted for \textsuperscript{54}. There is no doubt that in the past Iraq had a considerable chemical weapons capability. A U.S Government \textit{White Paper} released in February 1998, again notes Iraq had admitted to production of some 8,500 litres of anthrax, 19,000 litres of botulium toxin, and 2,200 litres of aflatoxin, after initial denial of such a programme. These had been loaded in to 25 Scud missile warheads, aerial bombs, and aerial dispensers. UNSCOM declared that is had supervised the destruction of over 40,000 CW munitions. It notes that in the absence of UNSCOM inspectors, Iraq could quickly restart limited mustard agents with a few weekly, full scale production of sarin within a few months, and reach pre gulf war production levels in two or three years. The most significant and proved fact so far is the seizure of gyroscopes and other material sourced from Russia, en route in Jordan and another consignment at the bottom of the Tigris\textsuperscript{55}. Clearly, there is a covert Iraqi effort to revive its once considerable capability.

More serious is the alleged transfer of key sensitive elements to other states like Libya (who indisputably needs quick solutions to a programme that has faltered ), and Sudan ( an alleged supporter of

\textsuperscript{53} Ibid.

\textsuperscript{54} Iraq unilaterally destroyed 83, UNSCOM supervised the destruction of 48, and accounted for all but two of the missiles. It must be noted that these figures are contested. See “Iraq Weapons of Mass Destruction Programs” \textit{White Paper} U.S Government , released February 13, 1998. http://www.fas.org

\textsuperscript{55} This is dealt with more fully in following chapters. See Vladimir Orlov & William C, Potter, ” The Mystery of the Sunken Gyros”, \textit{Bulletin of Atomic Scientists}, November - December 1998, pp.34-39.
international terrorism )\textsuperscript{56}. It may be recalled that Libya and Iraq are two of the few states ( apart from the US) who have used chemical weapons post World War II). That this may have proved to be the only option left to Iraq is clear, though the degree of technology and capabilities passed on is controversial.

The report of the Task Force on Terrorism in a detailed briefing notes that Iraq had a close relationship with Sudan, with a Iraqi assistance in the form of a deployment that included several South African made G-5 1555mm guns equipped with both high explosive and chemical shells, as well as 14 Scud –B launchers with several missiles along the Red Sea coast across from Yanbu and Jeddah. In early January 1991 additional Scud launchers were handed to the Sudanese government, who are said to have targeted them on southern Egypt, including the Aswan high Dam\textsuperscript{57}. Again in mid 1991, the Iraqi Deputy Prime Minister Tariq Aziz requested permission from Sudan’s President Umar al-Bashit to move Iraqi chemical weapons and additional SCUD missiles( around 400) to Sudan in order to circumvent their destruction by the UN. More controversial is the alleged shipment of f 93% enriched uranium originally from the Osirak nuclear reactor onward to Algeria. This has been denied by the Algerians, and

\textsuperscript{56} The following account of Sudan and Libya is taken from this report.

independent analysts note that the Osriaq fissionable material was in fact sent to Russia by UNSCOM.  

In 1995, the report alleges that Iraqis had begun to assist Sudanese in acquiring rudimentary chemical warfare capabilities. A CW facility was built during 1995 in Wau, in south western Sudan, some 300km from the Uganda border, in a factory which was originally a fruit processing unit. Production of mustard gas is understood to have begun in the fall of 1995, and was reportedly used against the rebels. In 1997, biological weapons were also moved to Sudan after a strategic understanding between the two, leading to another chemical weapons factory, (Kafuri, north of Khartoum) where warheads for rockets and tactical missiles were tested. In this effort they reportedly had the assistance of experts and technicians from Croatia, Egypt, Bulgaria, and Russia who were recruited by Iraqi intelligence for the Sudanese. Yet another was operated solely by the Iraqis (Mayu, south of Khartoum) formally known as the Yarmook Industrial Complex. Computers and other facilities were bought from Germany and France.

The danger of chemical weapons in Sudan came to the fore following the near simultaneous August 7, 1998 bombings of the U.S embassies in Nairobi, Kenya and Dar-es Salaam Tanzania. A team led by National Security Adviser Sandy Berger convened by President Clinton

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58 This was taken to Russia between November 15-19, 1991. See IAEA's inspections and Iraq's Nuclear Facilities” IAEA, April 1992 at http://www.iaea
decided on the option of military strikes.\textsuperscript{59} Less than two weeks later, the US launched simultaneous attacks on an alleged chemical weapons plant in Sudan (al – Shifa), and on terrorist camps in Afghanistan. (Operation Infinite Reach). The Counterterrorism centre of the U.S Central Intelligence Agency (CIA) assembled evidence linking the two to Osama Bin Laaden and linked the Shifa plant to CW development. On August 20, 1998 two U.S Warships in the Red Sea launched a dozen or more Tomahawk cruise missiles that destroyed the Al-Shifa pharmaceutical factory\textsuperscript{60}.

In this context it is useful to point out that the Al Shifa CW facility was never identified in the report of the \textit{Task Force on Terrorism} and that the U.S consultant who designed the plant, a British engineer who served technical manager for the plants’ construction from 1992 to 1996, and an Italian supplier who visited the plant in February and March 1998 all were at one in noting that entry into the plant was not restricted in any way, sentiments echoed by other nationals who all noted that the plant was not fitted out to manufacture chemical weapons\textsuperscript{61}. (However it is also true that none of these witnesses were chemical weapons experts, and also that a

\textsuperscript{59} The self dubbed “Small Group” was limited to just six top officials – the President, the Secretary of State Madeline Albright, National Security Advisor Sandy Berger, the Secretary of Defense William S. Cohen and the Chairman of the Joint Chiefs of Staff, and CIA Director George J. Tenet. The group gathered on August 10, 1999 at the White House Situation Room. It ruled out the use of ground troops or manned aircraft, and settled for Tomahawk cruise missiles. Attorney General Janet Reno was not informed until a day before, and she reportedly advised delay to enable the FBI (who were also informed a day earlier) to ascertain the evidence linking the Al-Shifa plant to CW capabilities. See Michael Barletta, “Chemical Weapons in the Sudan: Allegations and Evidence” \textit{The Non Proliferation Review} Fall 1998.pp115-136.

\textsuperscript{60} The Department of Defense gave no details on how many cruises were fired. Press reports ranged from six to twenty. The estimate could be on the larger side if in truth the plant was destroyed. David Fulghum, “Secrecy of Raids hints more to come” \textit{Aviation Week & Space Technology}, August 30, 1998.pp30

\textsuperscript{61} Barletta . Note 54.
very small part of the facility would have been adequate for the task.) The fact that there was hardly any military security around the plant, and the fact that the evidence is extremely flimsy, indicates at least considerable doubt on whether the plant at all produced anything even remotely connected to chemical weapons. Analysts note the main objections:  

- Soil sample collection prior to the attack were not reliable. No care was taken to ensure that the sample was not contaminated, or mishandled.

- Evidence of O-ethyl methylphosphonothioic or EMPTA did not necessarily mean that a plant contained CW agents since it had industrial applications (pesticide)

- All US diplomatic and intelligence personnel were withdrawn from Sudan in January 1996, thus leading to a yawning intelligence gap.

- Over a 100 intelligence reports were retracted by the CIA shortly after this – because it was concluded that the reports were sourced from a fabricator.

Finally, the earnest request by the Sudanese government that the facility be inspected by a UN team consisting of anyone (including Americans) again highlight the possibility of a mistake. Whether the other facilities identified by the Americans are again CW facilities therefore remains open to doubt.

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The Task force Report authored by well known analyst Youssef Bodansky, is considered as extreme, with some inaccurate data. Apart from the mistake about the Osriaq fuel, the allegation of “400Scuds” being transferred to Sudan via Yemen is contradictory to other reports mentioned above including the UNSCOM report. At the very least, it must be admitted therefore that the allegations of CW activity at Al-Shifa is open to the most serious doubt, while the reports of other facilities being involved in such research with Iraq is not credibly substantiated.

LIBYA

Libya obtained Scud-B and FROG-7 missiles from the Soviet Union in the 1970's. Though every effort appear to have been made to buy missiles from China and North Korea, it is significant that neither of these otherwise proliferant countries have responded.

Indeed, the first assistance was from a West German firm OTRAG (Orbital Transport und Raketen Aktiengesellschaft) which shifted in from Zaire to Libya in 1979. Though German government pressure led to the firms withdrawal in 1981, nonetheless the test of a 300km range missile both in 1980 and later in 1987 was possibly due to the fact that the head of the firm continued to stay in Libya, seeing to the health of the programme.63

There were also reports that 100 German scientists continued to work there in a project to produce a 500 to 750km missile system. Another West German company Globesat was also involved in yet another project.

Technical Oil Production assisted in exporting rocket valves for a missile called the "Al-fatah". Israeli sources noted that the AL Fatah was a 1,000 range missile, liquid fuelled, and in 1990 had undergone static engine tests. An attempt was also made to smuggle in ammonium perchlorate from Russia for solid fuels. The Ukrainians under US pressure impounded the shipment. After more than 15 years of development the AL-Fatah therefore is still not at the test stage. But if (or when) to come to fruition it could threaten parts of Italy, Sardinia, and Sicily (if based near Tripoli) or Greece, western Turkey and almost all of Egypt if based in Tobruk.

Libya is credited by some analysts, with having a highly successful WMD effort that has produced up to 100 tons of chemical agents. According to sources, Libya has had assistance from such diverse actors as China, Germany, South Africa in the manufacture of sarin gas in 1996. Technicians are also apparent from Thailand, Pakistan and Germany who have worked at Rabta the first chemical weapons production facility, while the facility at Tarunah is said to be another, which if operational could produce some 2,500 tons of poison agents a year. German technicians are reported to be working on the AL-Fatah programme, and there are also reports of Ukrainian and Serbian agreements to provide missile engineers for the project. However as of December 1998, the status of the missile


65 German engineers were arrested in 19 August 1996, while President Mandela promised to investigate the involvement of South African experts. See Dr. Joshua Sinai, "Ghaddaf'i's Libya : The Patient Proliferator", Jane's Intelligence Review, December 1998, pp.27-30.

66 Ibid. p.29.
arsenal was said to be maintenance plagued, while attempts to buy either North Korean or Ukrainian missiles had come to nothing.

However, if reports are to believed,\(^6\) this lack was being secretly corrected by Iraq. Though Libya and Iraq have not had the best of relations, Iraq may have been forced to transfer facilities as it became apparent that UN inspections were not to cease. At first, no complete projects were transferred, and only personnel were working at Libya's facilities (which this report notes as abysmal). However cooperation was formalized, though Iraq continued to be extremely guarded about Libyan financial inducements of Iraqi scientists, and took extreme measures to prevent this. In late 1994, as pressure mounted on Iraq, agreement was reached for the development of a long range basaltic missiles with a range of 1,000km. Ghaddafi agreed to pay the salaries of Iraqi experts – some $1,200 a month – as well as finance the acquisition of western technology. Iraq also offered to share biological weapons technology if Tripoli agreed to sustain and fund the revival of the Iraqi nuclear programme. Finally a cornerstone agreement was reported to have been reached on August 30, 1995 stipulated Libya's commitments regarding reviving the WMD programmes of Iraq. A Iraqi military nuclear project in its final stages was sent to Libya, spurred apparently by the "defection" of Kamal Hussein. A limited quantity of semi enriched fuel was also transferred by sea to Tripoli. A small nuclear "furnace" was to be located in the desert 380km south west of Tripoli. By the end of 1995, the experts began enriching the Iraqi nuclear material

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\(^6\) Report of the Task Force on Terrorism and Unconventional Warfare" Note. 31.
having successfully installed the small and medium kilns/furnaces there.\textsuperscript{68} The reports reference to "kilns" for enriching nuclear material is however not readily explainable, nor the reference to a nuclear furnace.

The biggest indication of the intimate strategic cooperation, according to the Report, was the transfer of Iraqi "assets" in terms of covert networks to the Libyans. Since the mid 1990's Iraqi intelligence had been directing purchases of dual use goods and sensitive technologies from Germany, Austria, Switzerland to Libya. Russian and other ex-Soviet scientists were given usually given South American passports and then sent on to Libya to work on the WMD projects. The results of this cooperation was that it apparently gave Libya a capability to produce a medium range missile that could hit the Mediterranean flank by 2006. (1,000 to 3,000km)\textsuperscript{69} Reportedly, Iraq also moved to upgrade Libya's chemical weapons production capabilities, and also her biological weapons abilities. For the latter around a dozen Iraqi scientists were said to be working on a project that was titled under medical facilities and was called General Health Facilities. The Libyan biological program is said to be code named "Ibn Hayam" which is directly controlled by the Ministry of Defence.

\textsuperscript{68} Ibid.

\textsuperscript{69} This assessment was reflected in NATO report MC 161/96. Ibid.p.12.
Table 5.2
Libya's Ballistic Missiles

<table>
<thead>
<tr>
<th>Missile</th>
<th>Mobility</th>
<th>Guidance</th>
<th>Range (km)</th>
<th>Warhead Type (kg)</th>
<th>Number of launchers</th>
<th>Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>FROG-7</td>
<td>Mobile</td>
<td>Unguided</td>
<td>70</td>
<td>HE/C 435KG</td>
<td>40</td>
<td>Poor</td>
</tr>
<tr>
<td>SCUD-B</td>
<td>Mobile</td>
<td>Inertial</td>
<td>900-1000</td>
<td>HE/C 985</td>
<td>80</td>
<td>Poor</td>
</tr>
<tr>
<td>AL-FATAH (D)</td>
<td>----</td>
<td>---</td>
<td>950?</td>
<td>500?</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>


In the case of Libya, it is notable that neither of the two primary proliferators – China or North Korea – have passed on any technology or systems to this country, which speaks little of their alleged relentless quest for profits and/or strategic benefits. After all Scud-C range missile in Libya could effectively threaten parts of Europe. Indeed, the one country which has passed on technology regardless of geography are companies of German origin. As for the transfer of facilities from Iraq to Libya, the overwhelming number of reports point to the relatively sophisticated efforts by Libya in chemical weapons, while if the Bodnansky report is to be believed, Libya’s capabilities were crude. For a country with no aero-
industrial capabilities to speak of, the prospect of producing a missile even with substantial foreign assistance must remain a difficult task. Libya’s human resources in terms of technological capability and ability to absorb new technology is vital.

The level of threat felt by Italy – which is considered to be one the main targets for a future ballistic attack – is reflected by the fact that Italy supplied anti ship cruise missile to Libya (Otomat Mk-2), the longest range missile now in Libyan hands. While Libyan arms remain substantially of Soviet origin, there are significant inputs from the French, with *Combattante-II* class missile craft, and the *Mirage*–5 both in the arsenal.

**SYRIA**

Syria used once to be one of the Soviet Union’s staunchest allies in the Middle East, and also received the Scud-B and FROG-7 systems in the early 1970’s. In 1983, the Soviets delivered the SS-21 (120km/480kg) which has active radar bombing capabilities in the terminal phase to give it high accuracy to within 50 metre. The Scud-B can target almost all of Israel, northern and western Iraq, and the southern and eastern parts of Turkey and Cyprus. Syria is thought to have around 200 missiles with 18 launchers for each of the three systems\(^\text{70}\).

Missiles are central to Syrian strategy, especially as an insurance against Israeli superiority, and the experience of the inability of the Syrian air force to penetrate Israeli air space during the last war. Therefore Syria

\(^{70}\) Seth Carus quoted in [http://www.fas.org](http://www.fas.org)
would look for a missile with at least a 500km range that could act as a deterrent against Israeli nuclear strikes. The possibility of these being used in an offensive mode is remote, since the fear of reprisal would remain. A re-organization has been carried out of its SSM unites since 1982, so that by the end of 1988 the SSM forces were organized into three brigades, with perhaps another one formed if the North Korean missile have been inducted. It must be noted that Syria has no capability to build sophisticated warheads for its missiles, and needs foreign assistance.

Syria has therefore made a considerable effort to get more and longer range missiles. The SS-23 was refused by the Soviet Union in 1987, (which at this time was now looking for hard cash) and there are reports that North Korea parted with the Scud –C , (500km with a 700kg warhead) which would give Syria a capability to target the whole of Israel, northern and western Iraq, and all of sought eastern Turkey. Again North Korean Scuds were detected being shipped to Iran, with the ultimate destination being Damascus

Syria’s attempt to get the M-9 has already been referred to. This was reported by an Israeli sources as having been signed in December 1989 for $170 million for 140 M-9’s. However, since then US official sources have denied that China sold any M-9’s to Syria, while the Bush Administration received a pledge from China not to sell missiles to the Middle East.

72 Jerusalem Post, 12 December 1989, FBIS-China, 12 December 1989
note known if this pledge has since been kept. One source maintains that these were indeed transferred to Syrian in 1990-91, though China denies it.\textsuperscript{74}

Israeli sources point out that Syria has one of the most advanced programs in the developing world for chemical weapons. (a claim which is equally leveled at Libya) Production is said to take place at three sites, one near Damascus, the second near Hama, and the third centre in the Aleppo area. In 1985 it is reported that Syria began to manufacture large quantities of chemical warheads including Sarin nerve gas, for use with Scud-B and Scud-C missiles, as well as air delivered bombs with nerve gas. It is also said that Syria obtained the Soviet plant for type VX chemical warheads, which could be adapted to Scud missiles\textsuperscript{75}. This is likely since the design has been widely available in the developing world since 1970. It is said that West European and North Korean engineers play a crucial role in arming these Scuds, while there are also reports of Russian advisers, mainly in air defense. Advisers from Hungary, Bulgaria and China are also reported\textsuperscript{76}.

\textsuperscript{74} Aaron Lenner "Review of Syria's Missile Strategy" Almashad Alsiasi (Israel) 23 October 1996.

\textsuperscript{75} "Syria most advanced in Chemical weapons" MA'ariv August 8, 1996.

\textsuperscript{76} Ian O. Lesser, Ashley J. Tellis "Strategic Exposure: Proliferation around the Mediterranean" RAND, MR-742-A, 1996, p.72.
Table 5.3
SYRIA'S MISSILE CAPABILITY

<table>
<thead>
<tr>
<th>Missile</th>
<th>Mobility</th>
<th>Guidance System</th>
<th>CEP (m)</th>
<th>Range (km)</th>
<th>Warhead</th>
<th>Launchers</th>
</tr>
</thead>
<tbody>
<tr>
<td>FROG-7</td>
<td>Mobile</td>
<td>Unguided</td>
<td>500</td>
<td>70</td>
<td>HE/C?</td>
<td>18</td>
</tr>
<tr>
<td>Scud-B</td>
<td>Mobile</td>
<td>Inertial</td>
<td>900-1000</td>
<td>300</td>
<td>HE/C</td>
<td>20</td>
</tr>
<tr>
<td>SS-21</td>
<td>Mobile</td>
<td>Inertial /active radar homing</td>
<td>30 or 300</td>
<td>70</td>
<td>HE/C</td>
<td>18</td>
</tr>
</tbody>
</table>

EGYPT

Egypt has nuclear research reactors aimed at producing a steady supply of energy, but is not known to have the nuclear fuel cycle facilities. Egypt was one of the first to evince interest in missilery in the Middle East, with a program that dates back to the period immediately after the Second World War. Facing the same problems as the western powers, but with much less resources to back it, the program was naturally in difficulties, though it did have German engineers working on it for a while. Egypt’s arsenal consists of a few FROG and Scud-B and the indigenously produced Sakr-80 (which is more of an artillery rocket). Reports of collaboration with the North Korean to produce a 450km range variant of the Scud-B (Project-T) was planned and some sources note that this began
in 1990 and a 90 missile inventory was planned. Egypt is also in the market for the Scud-C and Scud-D (1,000km) which would allow a reach into Italy, and Greece. The “Condor” missile program that once saw Argentinian, Iraqi and Egyptian collaboration was terminated before any flight testing took place, but the indigenous programme continues under the code named “Vector”, but is understood to be poorly financed and prioritized.

Egypt’s cruise missile “capability” is a mix of Italian, Russia, Chinese and American types (Ottomat, Styx, CSS-N-2, and the Harpoon) all are in the anti-shipping mode. After Israel, Egypt has the second largest technical infrastructure in the Middle East. Missile modifications are therefore possible, but a well equipped Air Force means that this would be the preferred form of delivery. Egypt also has at least one multirole RPV but these appear to be designed primarily for battlefield use rather than as a strategic land attack. This arm may be extended in future.

Table 5.4

EGYPTIAN MISSILE CAPABILITY

<table>
<thead>
<tr>
<th>Missile</th>
<th>Range</th>
<th>Warhead type(kg)</th>
<th>Source</th>
<th>Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>FROG-7</td>
<td>70</td>
<td>HE/C 435</td>
<td>FSU</td>
<td>Obsolete</td>
</tr>
<tr>
<td>SCUD-B</td>
<td>900-1,000</td>
<td>HE/C</td>
<td>FSU</td>
<td>Ops/Obs</td>
</tr>
</tbody>
</table>


77 Jane’s Weapons Systems Issue 12.
78 Lesser and Tellis, Note 48.
From the above it is clear that at present, none of the countries barring Israel and Iran, have anything like a capability in ballistic missiles that could threaten the European mainland. Those countries who form the Mediterranean rim similarly have cruise missiles supplied by European countries, and the capability to turn them into a credible land attack mode can virtually be ruled out, since none have anything approaching a aero-industrial capability.

In the Middle East, the only top dog in terms of missile capability is clearly Israel, which remains far above the level of technology that is apparent in the rest of the Arab world. The second most capable power was Iraq, and while it does retain a latent scientific and technical manpower base, and has the motivation to re-launch a missile programme, its actual capability is in fact unknown. The seizure of the gyroscopes as well as other instrumentation does point towards a regeneration of missile capability. However, as of now there is no clear picture. Iran has made a quantum jump in technology, moving from the most basic rocket technology to a MRBM capability. This offers the most evocative picture of the proliferation galloping out of control.

However, Iran's capability seems to be an "off the shelf" buy, and if her ability to produce and improve upon these machines remains low, Teheran will remain at the mercy of the strategies of her suppliers for at least the medium term. The inputs from important "Islamic" allies like Pakistan is one that will ensure that the ties will continue. However in the long term, Iran may see become a rudimentary missile power in her own
right. Given the increasing power of Iran, regional dialectics demand that others in the vicinity will quickly try to "boot up" their own programmes.

In the medium to long term, a slow increase in missile capability can be predicted, though the rise in technological capability is tied to the kind of assistance that key regimes are now getting. A rise in defensive capabilities in the form of ATBM is already apparent in Israel, and these are likely to further increase the interest in horizontal proliferation.