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Iran's Military Forces: 1988-1993

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Note

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I. Strategic Climate, Expenditures, and Arms Transfers[1]

It is tempting to deal with Iran and Iraq as common threats to southern Gulf and Western interests. It also, however, is highly misleading to do so. Both nations may be politically hostile to their neighbors and the West in many ways, but political and ideological hostility does not inevitably lead to military action. Particularly in the case of Iran, it is far from clear that a revolutionary ideology means a willingness to engage in direct military encounters. In spite of its rhetoric, Iran seems less prone than Iraq to take risks. If it faces strong deterrent forces, it may focus more on political action and its domestic needs than the use of force and military attacks.

Iran's current government cannot be treated as a monolithic or hostile regime in the way that may be appropriate to Iraq. Iran has become more pragmatic since the death of the Ayatollah Ruhollah Khomeini. Iran's recent history has been less aggressive and violent than Iraq, it is developing growing economic ties with the West, and it has sought to improve its diplomatic relations with the southern Gulf states. At the same time, it is unclear that pragmatism means an evolution towards moderation, as distinguished from a more realistic assessment of the balance of power in the region. Iran remains a revolutionary Islamic society which often takes extremist positions. Its government is repressive, and has often support political violence or "terrorism" overseas. Even when Iran has sought better relations with its southern Gulf neighbors and the West, there have been arrests, beatings, and assassinations which indicate that the Iranian regime is divided and still has strong hard-line elements.

The same "dualism" that affects Iran's politics and foreign relations, affects its military development. On the one hand, Iran is actively building up its military forces in ways which it can use to threaten and intimidate its neighbors. On the other hand, Iran has legitimate needs for strong defenses. It fought Iraq for eight years, after Iraq first invaded Iran in 1980. Geography threatens Iran as well as makes it a threat. Iran is located in what has come to be called the arc of crisis, and its boundaries span the distance between the former Soviet Union and the Gulf and between Southwest Asia and the Middle East. Iran has an area of approximately 1.65 million square kilometers. It has a 1,690 kilometer boundary with the former Soviet Union, a 499 kilometer boundary with Turkey, a 1,448 kilometer land boundary with Iraq, a 909 kilometer boarder with Pakistan, and a 936

kilometer border with Afghanistan.[2] It has a 3,180 kilometer coastline on the Gulf and shares the Shatt al-Arab with Iraq.[3]

Revolution Versus Pragmatism

Iranian politics have changed significantly since the end of the Iran-Iraq War in August, 1988, and the Ayatollah Ruhollah Khomeini's death on June 3, 1989. The Ayatollah Ali Akbar Hashemi Rafsanjani has emerged as Iran's dominant political figure and he has proved to be a notably more pragmatic leader than Khomeini. At the same time, the clergy has less political visibility and less direct influence over day-to-day Iranian politics. Khomeini's death replaced his charismatic religious leadership with that of the Ayatollah Ali Hoseini Khamenei.

While Khamenei has sometimes echoed Khomeini's extremist rhetoric -- and has often taken a hard-line towards Israel, the West, and Iran's southern Gulf neighbors -- he does not seem to have opposed many of Rafsanjani's efforts to deal with the political realities of international life and the economic realities of internal development. Khamenei also lacks the kind of prestige and charisma that allowed the Ayatollah Ruhollah Khomeini to exploit the position of supreme religious leader -- or Velayat-e-faqih -- to act as a virtual shah.

Rafsanjani and Khamenei have sometimes taken different public positions, but they seem to have cooperated in many important instances. This includes the selection of candidates for Iran's parliament in 1992, although Rafsanjani played the dominant role. The election was the first major election since Khomeini's death and the choice of candidates before the election was critical in determining the outcome.

Rafsanjani was able to manipulate the Council of Guardians, the ruling religious body in Iran, which is charged with reviewing all candidates for the Consultative Assembly. Some 3,240 potential candidates applied to the Council of Guardians to run for the 270 seats in the Consultative Assembly or Majlis, and Rafsanjani was able to use his influence to weed out some candidates he felt were radical or extremist. The election took place on April 10, 1992, with a second round in early May. Both rounds of voting gave a clear majority in the Consultative Assembly to supporters of Rafsanjani and those favoring more pragmatic economy policies. Hard-liners like Mehdi Karrubi, Ali Akbar Mohtashemi, and Mohammed Koiniha lost power, and Rafsanjani was able to replace a large number of hard-line ideologues in the civil service with technocrats.[4]

It is difficult, however, to be certain of the current relative position of Rafsanjani and Khamenei in terms of strategic and military power. Khamenei has nominal control over the armed forces, but Rafsanjani has exerted practical authority as the leader of the Supreme

Council for National Security. There are few signs of active feuding between them. Khamenei continues to take a more hard-line public stand on most issues than Rafsanjani, and acts as the voice of anti-Western orthodoxy, but he rarely seems to challenge Rafsanjani directly on any major issue.

At the same time, Iran's new leadership has had important failures. Iran has reinstituted population control in an effort to reduce birth rate that threatened to remain at 3.5%, but its measures to date have had less impact in reducing the birth rate than economic hardship, and apply largely to families with four children or more. It has sought economic reform, but has had only limited success. Iran has developed a good five year plan, but has not been able to properly implement it. It has devalued the currency and improved convertibility, but it has not been able to halt inflation -- which reached 30% to 40% in 1993. Import substitution is helping to compensate for a decline in oil revenues, but not at a rate that can eliminate a substantial deficit in comparison to exports, or give Iran anything like its desired rate of growth.[5]

The clergy has allowed Rafsanjani to liberalize some private economic activity, and to invite many exiles to return to their businesses, but only as long as they do not challenge the clergy's new role in the economy. Reform has not had a major impact on the agricultural sector, and many aspects of domestic industry. Allowing foreign borrowing has been badly mismanaged, and Iran's foreign debt has leapt from nearly zero at the time of Khomeini's death to $26 to $32 billion -- largely in terms of short-term loans. By the spring of 1993, Iran was $ 2 billion in arrears to Germany, $700 million to Japan, and $150 million to France.[6]

Rafsanjani has not been able to deal with the Bunyods, the main instrument of clerical power in the economy. These large religious foundations were formed to manage the property and other assets confiscated from the Shah and his supporters after the revolution, and have given the clergy considerable wealth and economic leverage: The largest of these Bunyods, the Mustazafan or Foundation for the Oppressed, had a budget of $10 billion in 1992.

The clergy and the Bunyods continue to block many aspects of reform, inhibit the creation of many private enterprises, and limit or vitiate efforts to liberalize foreign trade and foreign investment. The largest of the Bunyods, the Mustazafan, which controls hundreds of companies, is under the control of Mohsen Rafiqdust -- a revolutionary hard-liner and former Minister of the Islamic Revolutionary Guards Corps (IRGC).[7] Ironically, Iranian fundamentalism has proved capable of doing almost as much damage to Iran's economy as secular Arab Socialism did to the economics of nations like Algeria, Egypt, Syria, and Iraq.

Iran has also nationalized enough companies so that the ministries in charge of reform have also become part of the problem. While the government has privatized some 60 companies, this has had little real impact. The Ministry of Industry, for example, retains over 200 companies, and the Ministry of Heavy Industry retains over 117.[8]

The resulting lack of development is having a major impact on Iran's economy which cannot be offset by its oil revenues. Iran benefited from the rise in oil prices after the Gulf War, and its production has risen from 2.4 million barrels a day to heights of nearly 4 million barrels. It has produced at sustained rates well in excess of 3 million barrels a day, and is trying to increase its capacity rising to 4.5 million barrels -- although Iran may find it very difficult to sustain production at levels above 3.5 million barrels a day.[9] In spite of this increase in production and production capacity, however, oil prices have dropped in real terms. Iran's rise in oil income did not last through 1992. Iran's oil revenue dropped from around $20 million in 1991 to about $15.9 billion in 1992, and will probably be less than $14.9 billion in 1993.[10] This drop has a critical impact on Iran's economic development since 65% of all funds for Iran's five year plan come from oil revenues.[11]

The impact of the revolution, war with Iraq, lack of comprehensive economic reform, and population growth have combined to impoverish much of Iran's middle class, sharply restricted the growth of industry, and left Iran heavily dependent on food imports. While Iran has made some progress in land reform, it has not made agriculture more efficient. The slums surrounding Iran's cities have become poorer and more crowded than at the time the Shah fell. Per capita income was roughly $1,500 in at the time the Shah fell and is now less than $1,200. Iran's young population also faces special problems. There are few jobs for unskilled graduates, and when Iran claimed unemployment 10% in mid-1993, the real figure was probably more like 15% to 20%. The failure to expand academic institutions has led to a situation where some 700,000 students compete for 60,000 university places -- 40,000 of which have some form of earmarking for the children of veterans and the IRGC.[12]

These problems helped lead to riots in Iran, and the imposition of martial law in Arak, Shiraz, and Mashad in 1992. The government was forced to set up special anti-riot police forces, and Iran's Chief Justice, Mohammad Yazdi went so far as to threaten swift punishment and the use of firing squads. This did not stop new riots in Tabriz, when some 30,000 protesters reacted to the razing of 300 squatter dwellings.

Iran avoided major violence in the latter part of 1992 and in 1993, and Rafsanjani seemed to have moderate popular support when he was reelected on June 10, 1993. Rafsanjani won with 63% of the vote. At the same time, the election was scarcely a triumph. The four authorized candidates that the Council of Guardians chose to run against Rafsanjani, out of 128 applicants, were comparative unknowns and several spent more time

praising Rafsanjani than campaigning for themselves. Some 13 million people, or half the electorate abstained. Rafsanjani had to use the security services to suppress hard-line opposition and criticism after the election, arrest key hard-liners, and had only partial success in making hard-line papers like Salaam and Kayhan to alter their content and style. Even so, the most right-wing candidate, Ahamd Tavakoli, won 27% of the vote.[13]

There is still a great deal of social and economic discontent, and resentment of the power of the Bunyods and corruption of the Mullahs. This was reflected in the fact that the Majlis refused to give Mohsen Nurbakhsh, Rafsanjani's choice as Finance Minister, a majority on August 17, 1993 -- after a bitter two day debate about the government's mismanagement of the economy. It is also reflected in surveys that show a growing popular pessimism regarding the ability of the revolution to offer an improved living standard.[14]

Recent Developments in Iran's Military Forces

There have been a number of improvements in the overall organization of Iran's military forces since the Ayatollah Ruhollah Khomeini's death. The division of Iran's military forces into "regular" and "revolutionary" branches has long been a source of internal problems. Rafsanjani recognized this when he was appointed commander in chief during the Iran-Iraq War, but Khomeini blocked Rafsanjani's efforts to merge the Islamic Revolutionary Guards with the Iranian regular army from June 1988 to August 1989. After the war, Khomeini put a hard-line mullah in a position where he had authority nearly equal to that of Rafsanjani, and gave him supervisory authority over the IRGC Minister Ali Shamkani and IRGC Commander Mohsen Rezaii. These actions reinforced the feuding between Iran's regular forces and IRGC that helped contribute to Iran's defeat.[15]

Rafsanjani and Khamenei seem to have reached a working accord over the control of the armed forces since Khomeini's death. Khamenei automatically became the formal commander of the armed forces when he became leader and president on September 2, 1989. At the same, Rafsanjani retains effective practical command as head of the Supreme Council for National Security. There does not seem to have been any major debate within the Iranian leadership over the need to change senior appointments to ease the tensions between the military factions, and the clergy has been less intrusive in shaping Iranian military developments.

The post-Khomeini changes in the leadership of the military and internal security forces seem to reflect an emphasis on cohesion, pragmatism, and effectiveness, rather than moderation. When Rafsanjani formed his own cabinet on August 19, 1989, he purged some extremists such as Interior Minister Ali Akbar Mohtashemi and Intelligence Minister Mohammad Reyshahri. He also appointed a number of leading technocrats to office within

the Ministry of Defense. At the same time, a number of the Ayatollah Ruhollah Khomeini's supporters and hard-line revolutionaries remain in senior positions. Further, Iran's Islamic Revolutionary Guards Corps has continued to remain under the command of Mohsen Rezaii (a strong revolutionary), retains considerable independence, and sometimes seems to act independently from the central government.[16]

It is hard to determine which changes in Iran's command structure represent the result of jockeying for personal power, and which changes have been designed to achieve other goals.[17] At the end of the Iran-Iraq War Brigadier General Ismail Sohrabi was dismissed as chief of staff for the failure of Iranian forces to hold at Faw, a number of other Iranian regular army officers were dismissed or arrested, and some may have been executed.[18] The Minister of the Revolutionary Guard, Mohsen Rafiqdust, was removed for incompetence in September, 1988 -- although he was then made military advisor to Rafsanjani and later was a critical position in the economy as head of the Foundation for the Oppressed.[19] These changes, however, do not really seem to have punished those who were guilty of causing Iran's defeat. In most cases, the need to find a scapegoat or personal politics seems to have shaped the decisions.

Rafsanjani has since presided over a number of command changes that have eased divisions within the military, which have improved efficiency, and which have mixed the guard and regular military leadership to reduce the friction between the IRGC and regular forces, and to improve efficiency. Two of these changes were especially important. The first was the abolition of the Ministry for the Revolutionary Guard in the fall of the 1989, and the creation of a Ministry for Defense and Armed Forces Logistics under Akbar Torkan, a close supporter of Rafsanjani.

Ali Shamkhani was moved from the position of Minister of the Revolutionary Guard to commander of the navy in October, 1989, and Torkan was given a portfolio that combined the administrative apparatus of the regular forces and IRGC. Torkan was a civilian with no clear ties to either the regular armed forces or Guards, and in a good position to be seen as relatively neutral.[20] This appointment marked the first meaningful attempt to set up a unified ministry of defense since the beginning of the revolution.

The second change was to transform the Supreme Defense Council into the Supreme Council for National Security in 1990-1991. Rafsanjani is the Secretary General of the Supreme Council for National Security, and has ensured that several of his loyalists play an important role in the Council. These include Iran's Foreign Minister, Ali Akbar Velayati.

Iran also adopted a broader military reform plan that called for the creation of a single chain of command in war, for a rationalization of the complex and unwieldy command system that had grown up around various subdivisions of the regular armed forces and

Islamic Revolutionary Guards Corps, for the development of national defense industries, and for the acquisition of modern arms. Command of all the armed forces was placed under a single Office of the Joint Chiefs of Staff in 1988, and this seemed to indicate that control of the regular forces and IRGC had been unified.

These changes, however, left the separate military branches of the IRGC intact, and the IRGC had enough political power to persuade Khamenei to reestablish its Central Headquarters Staff under Rezaii in 1989. The IRGC's joint staff was originally formed in late 1984, and now includes the commanders of the land, air, and naval branches of the IRGC.[21] The IRGC has, however, created relatively modern command structures within each of its branches since 1989, and these changes seem to have reduced some of the tensions between the IRGC and the regular forces, and between the IRGC and the government.

Pragmatic professionals have been appointed to some senior positions. These appointments included making Brigadier General Ali Shahbazi Chief of the Army Staff. Rafsanjani and Khamenei retained professionals like Brigadier General Mansoor Sattari as Air Force Commander, and Brigadier General Hussein Hansani-Sadi as Commander Armed Forces Ground Forces. This emphasis on professionalism has given the regular forces the most effective and stable command they have enjoyed since 1979.

Other measures seem to have been designed to improve political unity within the armed forces. The role of the Office of the Joint Chiefs of Staff was strengthened in 1992. The commander of this office was Hassan Firouzabadi, a civilian who has been associated with the Guards. The creation of this office and appointment not only created more unity at the top, it marked another attempt to mix regular force and IRGC commanders. Firouzabadi announced the creation of a Supreme Council for Military Policy to help implement the creation of clear roles and missions and command structures for the armed forces.

Some of the internal security services were "merged" in 1991. These mergers have not, however, created a unified internal security structure or made day-to-day life easier or less repressive for many Iranians. The police forces may be more firmly under Rafsanjani's control, but the IRGC and Basij continue to operate with considerable independence. The VEVAK and various clerical groups also seem to operate independently, and often in ways that are more repressive than effective.

At the same time, added professionalism has not meant any clear trend in favor of moderates or the regular armed forces. Major General Qassem Ali Zahirnezhad -- a hard-line Khomeini loyalist -- remains Khamenei's chief military advisor and Iran's highest ranking army officer.[22] Torkan was replaced as Minister of Defense by Mohammad Foruzandeh, a member of the IRGC, after Rafsanjani's reelection in 1993. Other senior radicals in critical

security positions include Ali Fallahian, head of the internal security services, and Mohammad Gharazi as Minister of Telecommunications, and Ali Larijani, Minister of Culture and Islamic Guidance. Some sources include Mohammed Ali Besharati, the Minister of the Interior. among this group although he seems to be a relatively moderate former member of the Foreign Ministry, and a supporter of Rafsanjani.[23]

The IRGC is also increasing its ability to act as an effective force. While the Islamic Revolutionary Guards Corps remains under the control of Rezaii, and most promotions seem to be decided upon by the IRGC's leadership, the IRGC is becoming a steadily more professional. It adopted military ranks and uniforms similar to those of the regular military in 1990. The high command of the IRGC has been extensively reorganized to create a modern staff system that operates in parallel to the command of the conventional armed forces.

Mohammed Baqer Zuiilqadr was made Chief of Staff of the IRGC Central Headquarters in 1989, and given special responsibility for enforcing discipline and requiring the IRGC to implement orders. Mustafa Izadi was appointed head of the IRGC ground forces in 1989, and Alireza Afshar was appointed commander of the Basij or volunteer forces in January, 1990.[24] Hussein Dehqan, the former commander of the IRGC contingent in Lebanon was appointed the first head of the IRGC air forces in April, 1990. He was then replaced by Brigadier General Hosein Jalali in early 1992, in what seems to have been an effort to give the air forces more professional leadership.[25] Hussein Alai was replaced as head of the IRGC naval forces by Ali Shamkhani in 1990 (who now heads both the regular navy and IRGC naval forces), and Brigadier General Hossein Mantequei is the commander of the IRGC's missile forces and seems to command its long-range missiles and weapons of mass destruction.[26]

There almost certainly will continue to be rivalry between the IRGC and regular forces. However, the political importance of any remaining political splits between the Iranian regular army and the IRGC -- as distinguished from a struggle for power within the armed forces -- may be limited. The regular forces are no longer the forces once shaped by the Shah. It has been more than a decade since the Shah's fall. Most of Iran's current military manpower has no Western training or history of loyalty to the former monarchy, is the product of the revolution, and fought for the revolution during the Iran-Iraq War.[27]

This mix of political and military developments has also probably improved the government's control over Iran's internal security -- in spite of Iran's economic and social problems. The regular forces are more closely aligned with the government. The IRGC and internal security forces are better disciplined and better organized. The People's Mujahideen and other opposition groups have little military power. The regime does not seem to face

any major ethnic challenges -- although it has some low level problems with Kurdish nationalists.

Iran's Regional Ambitions

The "dualism" within Iran is very clear in Iran's relations with other states. Iran has not given up attempting to export its particular brand of Islamic fundamentalism -- which often translates into Islamic extremism. At the same time, Iran is a major regional power, and it is difficult to separate the signs of a natural search for influence and political power from a search for regional hegemony and revolution.

Iran's Relations With Iraq and the Struggle Against the People's Mujahideen and Other Opposition Groups

Iran has not agreed on a full peace settlement with Iraq. While Iran held its first meeting with Iraq since the end of the Iran-Iraq War, in October 1993, the meeting that took place in Paris had little impact on their relations. Some religious radicals in Iran, and Iraq newspapers had argued for an alliance against Israel and the West. However, no agreement could be reached over the issue of reparations (Iran has made claims of up to $100 billion in reparations).

Iran has returned some small batches of prisoners of war since 1990, but it still holds up to 20,000 Iraqis captured during the Iran-Iraq War, and several thousand Iraqi troops that fled into Iran after the uprisings following the Gulf War. Iraq holds 5,000 Iranians. There is no agreement over navigation and ownership rights on the Shatt al-Arab, or each country's support of the other's most violent opponents.[28] Iran has stated that it will seize all of the Iraqi aircraft that flew to Iran during the Gulf War, and the only economic relations are a growing trade of smuggled Iraqi petroleum products that are exchanged for spare parts and food.[29]

Iran continues a duel with Iraq in which Iran backs anti-regime efforts by Iraqi Shi'ites, and Iraq allows the Iranian People's Mujahideen to attack Iran from Iraq. In a little noticed move during the Gulf War, Iran also supported military attacks on the People's Mujahideen camps in Iraq. On April 9, 1992, Iran sent several F-4 fighters to strike People's Mujahideen bases in Iraq, losing one F-4. It claimed -- with some justification -- that these strikes were in retaliation for Mujahideen ground attacks on two Iranian towns near the border on April 5, 1992. It stated that it conducted such raids in response to People's Mujahideen raids on Iran that were designed to disrupt its parliamentary elections, efforts to sabotage pipelines, and mortar attacks on Iranian border posts.

Iran repeated these air raids on May 25, 1993, and sent at least 12 Iranian aircraft against two of the People's Mujahideen camps in Iraq. One base was at Jalat, near

Sulaymaniyah, about 55 miles from the border. The other was at Ashraf, northeast of Baghdad -- a camp reported to have between 1,500 and 5,000 guerrillas. On July 23, 1993, Iraq claimed that Iran conducted a major artillery assault on Mujahideen camps in Iraq, including a three hour bombardment by multiple rocket launchers in the area of Sulaymaniyah.[30] Iran stated that its air raids were a retaliation for Mujahideen attacks in Iran that attempted to disrupt the Presidential elections, and for Mujahideen support of Iranian Kurdish rebels during the previous two weeks.

Iran then held maneuvers on the Iraqi border in Khuzestan, using an armored brigade, an IRGC force of about 8,000 men, helicopters, and fighters. Iraq retaliated by announcing in June, 1993, that it was deploying additional air and land units to the border area, although it is unclear any major redeployments actually took place.

The Iranian Ministry of Intelligence and Security (VEVAK) -- directed by Ali Fallahian -- is deeply involved in a battle of assassination and counter-assassination with People's Mujahideen representatives overseas. For example, VEVAK agents almost certainly caused the death of Kazem Rajavi, the head of the People's Mujahideen organization in Geneva on August 24, 1990; Mansour Amini, a People's Mujahideen supporter in Turkey on June 4, 1992; and Mohammed Hussein Naghdi, a leading member of the National Council of Resistance in Rome on March 16, 1993. The People's Mujahideen, however, began this war of assassinationn when it attempted to seize power in Iran in the early 1980s, and both sides have been equally guilty of sustaining this process of violence.[31]

While Iran's actions against the People's Mujahideen and National Council of Resistance can scarcely be called aggressive, the use of proxy forces both reinforces the tension between Iran and Iraq, and has broader implications in terms of increasing the division between religious and secular parties and Shi'ite and Sunni.

Iran has used the VEVAK and other security organizations to attack other opposition groups, including anti-regime Kurdish movements. Iran almost certainly carried out the assassination of two leaders of the Kurdish Democratic Party of Iran (KDPI). They killed the Abdul Rahman Qassemlou and two associates in Vienna in 1989, after arranging a meeting to "negotiate" with members of the Iranian government. They killed his successor, Sadeq Sharafkandi and three associated in Berlin on September 24, 1992. Like the People's Mujahideen, the KDPI is a violent opponent of Iran which has often used terrorism and assassination in attacking the Iranian regime, and Iraq has long provided support and arms for the KDPI. Like the proxy war in the 1970s between Iranian sponsored Iraqi Kurds and Iraq, however, the war of assassination between the VEVAK and KDPI may lay the groundwork for a more serious future conflict.

What is far less understandable is that the VEVAK, other Iranian security organizations, and other pro-Iranian groups with clear links to the Iranian government, have repeatedly killed Baha'is and moderate Iranian dissidents in Iran and overseas. Iran was clearly responsible for the assassination of former President Shahpur Bakhtiar and three bodyguards on August 8, 1991. Bakhtiar was 76, a played-out force in Iranian politics, and scarcely a serious threat to the regime. Yet, VEVAK agents set up the assassination using an extensive network of agents in France, killed Bakhtiar's secretary on August 6, 1991, and seem to have deliberately slit Bakhtiar's throat rather than simply shooting him.

Iranian intelligence agents and hard-liners have shot Iranian dissidents in France, Italy, Turkey and Switzerland, and possibly in eight other countries. A wide range of Western experts believe that Iranian agents killed the Japanese translator of Salman Rhusdie's Satanic Verses on June 12, 1991, and attempted to kill the Italian translator nine days earlier. They also seem to be responsible for the death of Fereydun Farokhzad -- a radio personality -- in Germany on August 4, 1992; and Abd al-Rahman Boroumand -- a supporter of Bakhtiar -- in Paris in April, 1991. Iran has repeatedly issued diplomatic passports to those who have been involved in assassination efforts, and Britain has expelled several would be Iranian assassins.[32]

A wide range of Western experts believe that Iranian security organizations fail to draw a line between attacking members of armed and violent opposition movements, and attacking peaceful opposition leaders. While it is difficult to generalize about what such actions say about the Rafsanjani government, it is one thing to meet terrorism with counter-terrorism, and quite another thing to meet moderation with murder.[33]

Iranian Relations with Other Gulf States

Iran has sent mixed signals in dealing with its southern neighbors. It has reduced some of its efforts to subvert its neighbors in the southern Gulf. It gave Kuwait back the six Kuwaiti airliners that Iraq had seized and flown to Iran during the Gulf War in May, 1992 (although only after trying to extract large fees), and made concerted efforts to improve political and economic relations with Kuwait, Saudi Arabia, and the other Gulf states on a number of occasions. Nevertheless, Iran has maintained at least low-level contact with anti-regime Shi'ites in Bahrain, Kuwait, Qatar, Saudi Arabia's Eastern Province, and the UAE. Iranian hard-liners encouraged a massive anti-American protest by Iranian pilgrims in Mecca on June 2, 1993, in spite of a pledge not to cause such incidents.

Iran has been involved in a dispute with the United Arab Emirates over the rights of Arabs living in Abu Musa, and control of Abu Musa and the Greater and Lesser Tunbs (Tunb al Kubra and Tunb as Sughra). There three islands are located in the lower Gulf north of Dubai and south of Qeshm island. They are north of the main shipping channels and west

of the Straits of Hormuz -- the entrance to the Gulf.[34] These islands offer Iran a significant strategic advantage in threatening tanker traffic through the Gulf -- which involve the movement of 20% of the world's oil and an average of 75 ship transits per day. The islands play a role in deciding claims to offshore oil and gas, and also extend Iranian waters to shield Iran's naval bases in the lower Gulf. -- and in extending its claims to offshore oil and gas.

Iran has some long standing claims to Abu Musa -- although such claims are subject to considerable historical dispute. Some authorities claim that Iran exerted at least indirect control over Abu Musa and the Tunbs before Britain seized control of the islands in 1887. Other authorities claim that Iran never exerted control over the Tunbs in modern times -- which have been under the control of the ruling family in Ras al-Khaimah. They also claim that Abu Musa was under the control of the ruling Arab family in Sharjah, which had branches living in both Iran and Sharjah, and whose main branch was in Sharjah.

Control of the islands became a significant issue in 1968, when Britain announced it would leave the Gulf. The Shah of Iran formally asserted an Iranian claim to Abu Musa, Bahrain, and the Tunbs. The Shah did not continue to press Iran's claim to Bahrain, but did strongly object to Britain's plan to transfer control of Abu Musa and the Tunbs to the new state it was forming out of the smaller Arab emirates in the southern Gulf -- the United Arab Emirates.

On November 30, 1971, on the day before British forces formally ceased to exert military control over the emirates, Iranian marines used hovercraft to seize Abu Musa and the Tunbs. Opinions differ over the circumstances of this seizure. Iran claims it seized the islands with the informal agreement of Britain to avoid military action, and with Sharjah's agreement to split control over Abu Musa, with 55% of the affected oil and gas revenues going to Iran and 45% going to Sharjah. It claims this is why it allowed some 700 UAE citizens to continue to live and work on the island. Iran also claims that the Tunbs were virtually unpopulated, and in its zone of control in the Gulf. Some exports on the region support these Iranian claims.

The UAE and some other outside experts feel that the Shah seized Abu Musa through sheer force majure. They feel the Shah timed his seizure to deliberately embarrass Britain and demonstrate his growing power in the region, and that he effectively forced Sharjah (which became part of the UAE) to accept his terms without meaningful negotiation.

In any case, the Shah did not press the issue of full sovereignty over Abu Musa while he remained in power. The issue lay dormant until the Khomeini regime raised the issue of full sovereignty shortly after the Shah's fall, but Iran did not press the issue further during

the Iran-Iraq War, or during 1989-1991, when Iraq remained the dominant military power in the Gulf. It did, however, use the island as a base for the naval branch of the IRGC during and after the Iran-Iraq War.

In April, 1992, however, Iran took full control of the entire island of Abu Musa, expelled about 100 foreign workers without Iranian visas, and expelled many of the Arab residents. Iran's motives for this action are unclear. It acted at a time when it was trying to improve its relations with the southern Gulf states, and some experts feel that Iran's action reflects a continuing dualism between the influence of pragmatists and extremists in the Iranian government. It should be noted, however, that Rafsanjani had visited Abu Musa shortly before the seizure and almost certainly had to approve it.

Iran went on to claim that the UAE had allowed Arabs who were not UAE citizens on to the island, and that it had not received a fair share of the offshore oil production from the waters near the island. The Iranian media soon began to refer to Abu Musa and the Tunbs as Iranian territory and as part of Hormuzgan province, and Iran took military action. During April 25-May 4, 1992, Iran staged the largest amphibious exercise that it had conducted since the end of the Iran-Iraq War. This exercise took place at the Straits of Hormuz. It lasted 11 days, practiced an effort to block the Straits to an outside invader (the U.S.), covered an area of some 10,000 square miles of ocean, and involved 45 surface ships, 150 small craft, and an unknown number of Iranian air force aircraft.

The UAE reacted with a proposal that would have solved the sovereignty problem by leasing the entire island to Iran, and altered the share of oil. When this proposal failed, Iran and the UAE became involved in a major diplomatic clash. In September, 1992, the UAE took an increasingly hard line, and obtained support from the Gulf Cooperation Council (GCC) and Arab League. Iran countered by charging that the GCC states and Arab League states had become U.S. plotters. Iran declared full sovereignty over the islands on September 24, 1992. It broke off talks with the UAE on September 28, 1992, after the UAE chose to bring the issue to the GCC and Arab League, and renewed its own claims to the Tunbs.

Rafsanjani declared the UAE's position was part of a U.S. "conspiracy...to justify its illegitimate presence in the Gulf." By October, the chief Iranian negotiator, Mustafa Haeri Foumani, was stating that, "No Iranian would allow himself to negotiate with others on the sovereignty of his own land." By late December, Iran deployed additional Islamic Revolutionary Guards Corps forces to the islands, and declared it was willing to defend the islands against any attack, and reminding its southern Gulf neighbors of its willingness to fight for eight years during the Iran-Iraq War.[35]

Like many of Iran's actions, the exercise of full control over Abu Musa and the Tunbs can be seen as part of either the reassertion of Iranian strength after its defeat in the Iran-Iraq War, or as part of an aggressive effort to dominate the Gulf which must be seen in the context of Iran's purchase of submarines, missiles, and advanced strike-attack aircraft. In practice, Iran's motives are probably opportunistic, and Iran's ultimate ambitions are more likely to be determined by the future strength of U.S. and southern Gulf forces than some master plan.

There are two other claims issues in the southern Gulf which could affect regional stability. First, Iran might still press its claim to Bahrain, in spite of the Shah's recognition of Bahrain's sovereignty and the fact Iran has sent ambassadors to Bahrain since the revolution. Several hard-line Iranian papers -- including Salam and Jomhuri Eslam -- called for Iran to reassert this claim on December 28, 1992. Second, Iran claims a significant portion of the offshore resources in the upper Gulf that Arab states feel are under their control. The offshore gas dome near Qatar is a key issue in point. Iran claims 40% of the dome. Western experts feel Iran only has a claim to about 10% of the waters over the dome, and Qatar feels that Iran has no claim at all.

Iran's Opposition to Israel and Secular Arab States

Iran denies Israel's right to exist. It is a vehement opponent of the Israeli-PLO peace settlement, and some leading Iranian religious and political figures have called for the use of armed violence to prevent it. Iran has clear connections to a number of armed revolutionary movements. Iran plays an active political role in nations like Lebanon and Sudan, and has supported anti-Ba'athist Iraqi Kurds, and anti-Ba'athist Iraqi Shi'ite forces in southern Iraq, with money, arms, and training facilities in Iran.

Iran still maintains large IRGC cadres in Lebanon -- and Syria now seems to provide the Hizbollah and Party of God with as much support as Iran -- Iran is still a significant force in the Shi'ite politics of southern Lebanon and in the fighting between Shi'ite elements, the South Lebanon Army, and Israel. Iran provides training, funds, and arms to a number of Palestinian extremist groups that attack Israel. Some experts believe that Iranian intelligence and the IRGC have organized various pro-Iranian cells of the Hamas, Hizbollah, and other groups. There is little evidence to date that such a formal terrorist network exists, but Iran has actively supported many groups that are associated with terrorism.

In October, 1991, it sponsored an "International Conference to Support the Islamic Revolution of Palestine" that included representatives of Hamas, the Hizbollah, PFLP-GC, Abu-Musa, and Islamic Jihad. All of these groups have been associated with terrorist violence. Iran has since provided funds, and possibly explosives, to the Palestinian Islamic Jihad, the Popular Front for the Liberation of Palestine -- General Command, and Hamas. It

has held other high level meetings with Palestinian extremist groups in Damascus, and hosted other meetings of the Hizbollah and Hamas in Iran, and several of these groups -- including Hamas and Islamic Jihad -- made statements acknowledging Iranian funding in 1993.[36] A number of reports indicate that Iran provided supported for the May 17, 1992 bombing of the Israeli embassy in Buenos Aires, and it may have attempted to bomb the Israeli embassies in Columbia and Ecuador.[37]

Iran has provided support to Islamic extremist groups in Algeria, Morocco, Tunisia, and Egypt. It has played a role in backing some of the more violent elements of the fundamentalist FIS movement in Algeria, although the rise of Islamic fundamentalism in Algeria is largely of native origin and has been triggered largely by decades of misrule by Algeria's military junta.

Tehran's Ministry of Intelligence and Security (VEVAK) has supported extremist movements in other countries -- most notably Turkey. U.S. and British experts believe that Iranian agents have provided funds, and possibly explosives, to the Turkish Islamic Jihad and the Kurdistan Workers Party (PKK) in Turkey. One related car bombing killed a U.S. air force sergeant on October 28, 1991. They seem to have killed an anti-fundamentalist Turkish journalist -- Ugur Mumcu -- on January 24, 1993, and attempted to kill a Turkish Jewish businessman on January 28, 1993. While Iran does not seem to have had any direct connection to the World Trade Center bombing in New York in 1993, Iranian-supplied bomb components may have been used.

Iran's Support of the Sudan

Iran plays a major role in supporting the Sudan's hard-line Islamic fundamentalist government, now led by Lt. General Omar Hassan al-Bashir and religious leaders like Sheik Hassan al-Tourabi. It continues to support the Sudan in its training of revolutionaries, and the Iranian ambassador to the Sudan was involved in the Iranian takeover of the U.S. Embassy in Tehran and creating the Hizbollah infrastructure in the 1980s. It has encouraged steady increases in the application of Islamic law, and some sources indicate that Iran shipped at least $17 million worth of arms to the Sudan in 1991, and continued to provide arms in 1992 and 1993. Iranian support for religious extremism in the Sudan is contributing to the extension of the bloody civil war between the Sudan's Arab and non-Arab population, and is steadily reducing the tolerance for Christian and secular elements in the northern Sudan.

These sources also indicate that Iran has provided training and support to Nafei Ali Nafel, the head of the Sudan's intelligence service. There is almost certainly some truth in these reports. Ali Falahain, the head of Iran's secret services, and Mohsen Rezaii, the head of the Islamic Revolutionary Guards Corps, have visited the Sudan on several occasions. What

are far more controversial are reports that Iran has sent 1,000 to 2,000 Revolutionary Guards to assist the Sudan's military forces.[38]

Iran's Actions in its Northern Border Area

Iran's dealings with its northern neighbors have also led to some concern that Iran is seeking to extend its influence over the region. Iran opened embassies in the Azerbaijan, Turkmenistan and Tadzhikistan Republics in 1991, and made a major effort to support the Islamic revival in these countries. It revived the long dormant Economic Development Council that once existed between Iran, Turkey, and Pakistan in the mid-1960s. The Azerbaijan, Kyrgyzstan, Tadzhikistan, Turkmenistan, and Uzbekistan republics joined this Council in a summit meeting on February 17, 1992. Iran announced at this meeting that it had signed a Caspian Sea cooperation pact with Azerbaijan, Russia, Khazakhstan, and Turkmenistan.

These Iranian efforts have led Turkey and Saudi Arabia to compete with Iran in providing money and advisors to competing secular and Islamic elements. None of Iran's actions seem particularly aggressive, however, and it is difficult to tell whether Iran has ambitions to dominate any of the former Soviet republics or is simply seeking economic and cultural influence. Iran has valid commercial and cultural reasons to seek to expand its influence. The Muslim republics are major potential markets for Iranian gas and oil, and some of the non-Muslim republics like the Ukraine are equally important potential markets.[39]

In 1993, Iran did begin to provide funds and arms to Islamic rebels in Tadzhikistan. Iran also issued warnings to Armenia and redeployed troops to its border with Azerbaijan that summer. However, Iran only acted to support the Azarbaijanis, when Armenian forces began to overrun southwestern Azerbaijan.[40] Iran was scarcely alone in supporting Islamic causes in this area, or provocative in trying to halt Armenian attacks on Azerbaijan. For example, Turkey joined with Iran to condemn Armenian attacks on the Azerbaijani enclave of Nagorno-Karabakh in May, 1992.

Iranian Military Expenditures

Like Iraq, Iran has often chosen guns over butter. This choice not only is a signal of the intentions of the regime, it raises strategic concerns about how Iran will treat its southern Gulf neighbors as it attempts to increase its oil revenues. Iran's efforts to increase its military strength almost inevitably put more strain on its internal security problems and its relations with its neighbors.

Oil is the key to understanding Iran's military expenditures. Iran is a major oil power, although there is considerable debate over how large its oil reserves really are. A very

conservative estimate of proven, economically recoverable, reserves gives Iran 35.6 billion barrels of oil, or about 4.4% of the world total, and 497 trillion cubic feet of gas, or 12.9% of the world supply. This same source estimates that Iraq has 9% of the world's supply of oil, and that Saudi Arabia has 21.1%.[41]

It is very difficult, however, to estimate the truth. Gulf states have recently tended to exaggerate their claimed reserves, and Iran has recently claimed reserves of 96 billion barrels and 950 trillion cubic feet of gas -- claims for oil reserves which roughly matched those of Iraq and Kuwait during the same period. These claims seem inflated, although some U.S. experts feel Iran does have 93 billion barrels. If they are true, they would give Iran about 10% of the world supply, as well as "parity" with Iraq and Kuwait. A more demanding set of assumptions might well, however, reduce Iran's recoverable reserves at current prices to only 65 billion barrels.[42]

Iran currently produces between 2.5 and 3.7 million barrels per day -- usually at the lower end of this range. This production has given Iran annual oil revenues of $7.4 billion to $22.0 billion during the last decade, with an estimated annual income of $15.9 billion in 1992, and $14.9 billion in 1993.[43] These revenues amount to nearly 90% of the value of Iran's exports, and finance about 65% of Iran's five year plan.

Iran has to use its oil revenues to pay for both its guns and butter.[44] These revenues are too small, however, to pay for large amounts of guns and maintain moderate living standards for its burgeoning population. The rest of Iran's economy is developing at a low rate, and Iran has less wealth per capita than it did under the Shah.[45] Iran's foreign debt has risen from nearly zero in 1989 to $9 billion in 1992, $18.8 billion in 1992, and $28-$32 billion in 1993. Iran was some $3 billion in arrears in making its debt payments in the spring of 1993. It has been forced to reschedule its debt payments, and no longer has easy access to foreign credit. Inflation is not controlled and approached 30% during 1993.[46]

Much of Iran's agriculture and light industry is still disrupted by the combined impact of revolution, the Iran-Iraq War, and mismanagement by Iran's religious leadership. Its infrastructure and educational system are still in considerable disarray and Iran has major problems with unemployment and under-utilization of labor. Its combined rate of unemployment and disguised unemployed has almost certainly exceeded 30% since 1989.[47] Iran is now heavily dependent on imports of food, although it has about 45.4 cubic kilometers of internal renewable water resources, which is relatively high for a Middle Eastern country.[48] Iran's post-Iran-Iraq War oil revenues have not been sufficient to cover its needs for arms imports, food imports, and imports for its civil economy.

Over the years, Iran has tended to chose guns over butter. The Khomeini government initially cut military spending after the revolution, but the start of the Iran-Iraq War in 1980

forced Iran to raise its military expenditures, and into a desperate search for arms imports from other countries. Iran, however, could not find a major source of large scale imports of Western arms munitions and supplies. It had to buy new types of arms from the People's Republic of China, North Korea, the Soviet bloc, and other developing countries. As a result, Iran could not compete with Iraq during 1980 to 1990 in terms of total military imports or in obtaining high capability weapons.

Iran's problems eased somewhat after the start of the Gulf War. Iraq replaced Iran as the "pariah" of the Gulf. Iran's economy experienced a limited recovery from the Iran-Iraq War and mismanagement during the time of the Ayatollah Ruhollah Khomeini. Most importantly, Iran found a new source of advanced arms in the Russian Republic and Central Europe, while continuing to expand its purchases from the People's Republic of China and North Korea. Nevertheless, Iran's economic problems still severely limit what it can spend on defense.

It is impossible to provide a reliable estimate of Iran's military spending in recent years. The U.S. Arms Control and Disarmament Agency (ACDA) has not issued an unclassified estimate of Iranian military spending for any year after 1985, but the IISS has estimated that Iranian economic problems, and defeat in 1988, reduced Iran's defense spending to $9,900 million in 1987/88, $5,770 million in 1989/90, $3,180 million in 1990, and $4,270 million in 1991.[49] These estimates, however, do not include some key procurement expenses and many of Iran's expenditures on weapons of mass destruction. The U.S. Central Intelligence Agency (CIA) estimates that Iran spent $13 billion on defense in 1992, and that this was 13% to 14% of its annual GDP. At the same time, other U.S. government experts feel that Iran may only be able to spend some $5 to $8 billion in 1993. [50]

Any estimate of the burden military expenditures have placed on Iran's economy are even more uncertain, and Iranian official economic statistics have little reliability. Iran reported total military expenditures of only $1.8 billion in 1992, and $1.2 billion in 1993, versus a GDP that it estimated at $71 billion in 1992. In practice, Iran actually seems to have spent 10% to 15% of its GDP on military forces and equipment since 1988. It spent 20% or more of its GDP on defense during much of the Iran-Iraq War, and over 50% of its central government expenditures.[51]

Unless oil prices rise sharply for other reasons, the combination of military expenditures and domestic needs seems likely to push Iran towards progressively more hard-line efforts to persuade its neighbors to cut production and raise oil prices. While Iran has recently cooperated with Saudi Arabia and other OPEC states in attempting to stabilize oil prices and set production quotas, it will be under steadily increasing economic pressure to try to force its southern Gulf neighbors to cut their production. Iran has also talked about

raising production capacity to 4.5 million barrels per day by 1994, and 5 million barrels per day by 1995, and investing $5 billion in on-shore and off-shore oil drilling, exploration, and development. It is uncertain whether Iran can actually produce at these levels, but its investment will serve little purpose if it simply cuts prices.[52]

Few experts believe demand will rise quickly enough to allow Iran to meet its revenue targets unless other states cut production. Iran will find it harder and harder to fund its ambitions, and its only way of obtaining more revenue will be to raise its oil revenues. This problem will become even more serious once Iraq is allowed to resume its oil exports. Mere reports that Iraq would resume exports of even 1.5 million barrels a day put significant downward pressure on oil prices in the early winter of 1993. The oil issue may well lead Iran to try to intimidate its neighbors, and to use the threat of force or unconventional warfare to put pressure on the southern Gulf states.

Iranian Conventional Arms Transfers

Iran's ability to import arms has improved significantly as a result of the Gulf War. Iran's opposition to Iraq's invasion of Kuwait gave Iran new respectability and better access to the world's arms markets. Beginning in 1991, Iran was able to import first line tanks like the T-72 and aircraft like the MiG-29 and Su-24 from the Russian Republic. It obtained easier access to equipment and supplies for its biological and chemical weapons efforts, and got increased -- if still limited -- imports of high technology for its nuclear weapons program.

The Volume of Iran's Arms Transfers

This improved access to arms is critical to Iran's military development. Iran never had enough hard currency and access to the world market during the 1980s to compete with Iraq in expanding and modernizing its forces. During 1979-1983, Iran ordered $5.4 billion worth of arms, compared to Iraqi orders of $17.6 billion. During 1984-1988, Iran ordered $10.5 billion worth of arms compared to Iraqi orders of $29.7 billion. Iran obtained only $10 million worth of arms from the U.S., although it did somewhat better with European suppliers. These figures indicate that Iraq imported more than three times as many arms as Iran.[53]

Iran's continuing arms import problems played a major role in shaping Iran's defeat in the Iran-Iraq War. Shortages in Western arms, munitions, and spare parts crippled Iran's armor, air force, and navy. The final battles of the Iran-Iraq War then cost Iran much of the land forces equipment it had been able to obtain from the People's Republic of China, North Korea, and Central Europe. According to most estimates, Iran lost over 40% of its major army equipment during its final battles before the August, 1988 cease-fire.

These wartime losses help explain why Iranian arms imports remained high after the cease-fire in 1988. U.S. experts estimate that Iran ordered $6.7 billion worth of new arms between 1989 and 1992. The main sources of these new orders during 1989-1992 were $4.3 billion from the former Soviet Union, $1.1 billion from the People's Republic of China, $0.1 billion from major Western European countries, $0.5 billion from the rest of Europe, and $0.7 billion from other states. Iran took delivery on $4.5 billion worth of arms during 1989-1992. Deliveries included $2.2 billion from the former Soviet Union, $ 1.1 billion from the People's Republic of China, $0.1 billion from West Europe, $0.3 billion from the rest of Europe, and $0.8 billion from other states.[54]

Such purchases do not clearly indicate that Iran's arms import programs are "aggressive." The Director of the CIA has publicized the fact that Iran's annual arms imports were worth as much as $2 billion a year in 1992. Iran's new arms orders totaled $6.7 billion during 1989-1992 versus $10.7 billion during 1985-1988 -- a period of similar length during the Iran-Iraq War.[55] Iran's receipts of actual deliveries were worth $4.5 billion during 1989-1992 compare with deliveries of $9.0 billion during 1985-1988.[56]

Iran's arms transfers are not part of a massive build-up by previous Iranian standards. Many would be necessary to replace combat losses and aging Western equipment, regardless of Iranian equipment. The figure of $2.0 billion a year quoted by the Director of the CIA also seems to represent a rounding of figures based on trends during 1990 and 1991. While Iran did place major orders after the cease-fire in the Iran-Iraq War, it cut these orders when it experienced a steadily growing economic crisis.

Data provided by U.S. government experts to Richard Grimmett of the Congressional Research Service indicate that new Iranian agreements totaled $2.86 billion in 1990, $1.9 billion in 1991 and only $300 million during 1992. They show that deliveries totaled $1.4 billion in 1990, $1.5 billion in 1991, and only $300 million in 1992.[57] Other U.S. government experts indicate that Iran's economic crisis drove arms imports down to $800-$1,000 million in 1992. Iran's Minister of Defense reported a hard currency budget for 1993-1994 of $850 million.[58]

These figures for annual Iranian orders and deliveries compare with annual orders and deliveries ranging from $2.5 billion to $3.5 billion in constant 1993 dollars during much of the Iran-Iraq War.[59] This comparison does not mean Iran's military imports recent arms imports are small. They are large enough so that Iran ranked third in new arms orders in the developing world during the period between the end of the Iran-Iraq War and the Gulf War, and fourth in deliveries. Further, it must be stressed that these totals do not include some important expenditures on weapons of mass destruction.[60] Iran's imports are not, however,

of a scale that clearly warns of aggressive behavior or an indifference to social and domestic needs.

The Content of Iran's Arms Imports

The content of Iran's arms purchases during the early 1990's reflected a mix of Iran's new access to arms from the Russian Republic and Central Europe, and continuing dependence on the People's Republic of China and North Korea. Access to Russian sales was particularly important because it gave Iran access to more advanced technology. Rafsanjani seems to have reached a $1.9 billion sales agreement with Russia during a June, 1989 trip to Moscow that traded the delivery of gas through the IGAT II pipeline for Soviet agreement to sell Iran 48 MiG-29 fighters, 100 T-72 tanks, and other equipment and services.

These numbers are as difficult to put in perspective as the data on the size of Iran's arms purchases. On the one hand, Iran has only 950-1,000 tanks in its forces versus 1,735 in 1980, and 250-280 combat aircraft versus 445. The overall quality of its conventional arms are also far less advanced relative to those of its neighbors than they were at the time of Shah. On the other hand, there are conflicting reports that Iran has plans to make massive arms orders in the future.

Iran may have made a $6 billion arms deal with Russia in July, 1991. According to some People's Mujahideen reports, an agreement was signed in Moscow between Lt. General Yevgeny Shaposhnikov and General Mansur Sattari, the head of the Iranian air force, for Iran to buy a T-72 assembly plant, 122mm and 130mm guns, 100 MiG-21 fighters, a MiG-29 assembly plant, 48 MiG-31 air defense fighters, 24 Su-24 strike fighters, and two IL-76s equipped as airborne warning aircraft. Other reports during 1991 indicated Iran ordered 200 T-72s and a T-72 production plant from the former Soviet Union, or had ordered 1,500 T-72s from Czechoslovakia.

News sources reported in mid-1992 that Iran had a $10 billion arms plan to acquire new army, air defense, air, and naval equipment during 1990-1994. Other sources indicated in the fall of 1992 that Iran had a plan that would increase its tank strength from 500 in 1990 to 1,400 in 1997, its combat aircraft strength form 275 to 350, its surface-to-air missile strength from 90 major launchers to 300, its surface-to-surface missile strength from 30 major launchers to 60, and its submarine strength from zero to three. Less reliable sources reported orders of 400 more Soviet T-72s and 500 BMP-2s, and orders of 170 North Korean Scud B and Scud Cs, and People's Republic of China-made M-11 missiles in 1991.

Reports surfaced during 1993 that Iran had a $7 billion arms import plan and plans to order 1,500 T-54s/T-55s, and 300 T-72s, from Poland, and supersonic Sunburst anti-ship missiles, SA-10 (S-300) surface-to-air missiles, 3 more Kilo submarines, 50 more MiG-29s,

and 200 more T-72Ms from Russia and the Ukraine. One report indicated this arms import plan would cost up to $20 billion. Still other reports stated that Germany and other European countries were making massive transfers of dual-use technology, equipment, and manufacturing capabilities, and Iran was seeking to buy Boeing and Airbus commercial aircraft for dual-use in military transport and refueling efforts.

While many of these reports seem exaggerated, and come from hostile Iranian opposition groups, it is clear that Iran is seeking additional combat aircraft, missiles, main battle tanks and other armored vehicles. Most experts agree that Iran succeeded in buying some T-72s, Kilo submarines, MiG-29s, Su-24s, artillery, SA-5 surface-to-air missiles, and guided air weapons from Russia and other states of the former Soviet Union during 1991-1993. They agree that deliveries and orders from the People's Republic of China included versions of the SA-2 surface-to-air missile, F-7M fighters, and artillery. They agree that Iran obtained parts and supplies from Central Europe, electronics from Western Europe, and large numbers of parts and spares from Asia -- including parts for U.S.-made equipment from Vietnam.

It is clear that Iran obtained extensive long-range missile deliveries from North Korea and CSS-8 short-range ballistic missiles from the People's Republic of China, and ordered new long-range missiles from North Korea and missile production technology from the PRC.[61] Further, Iran has found a supply of parts for its M-113 armored personnel carriers, is buying F-5 parts on the black market, and is seeking to buy used F-5s from Indonesia.[62]

Continuing Problems in Iran's Arms Imports

Ambitious as these Iranian efforts may be, they must also be kept in perspective. Most of Iran's Western-supplied equipment is 15-25 years old, and saw hard service in combat during the Iran-Iraq War. Some has been "cannibalized" to keep some weapons operating at the expense of others. Some use spare parts that have been obtained from Third World suppliers that are worn or not of high quality. Some key parts for Western-supplied equipment are no longer in supply because the original manufacturer has halted production or modified the system so much that equipment must be extensively modified or rebuilt to use the new or available parts and sub-assembly.

Iranian maintenance services have always been poor to mediocre, and these problems cause Iran steady equipment losses through age and attrition. They force Iran to mix its aging Western-supplied equipment with a wide mix of equipment that has been obtained form non-Western sources, that is generally inferior, and which is not interoperable.

Iran's increased "respectability" since the end of the Iran-Iraq War has scarcely given it open access to arms, technology, and spare parts. The Bush and Clinton Administrations

have made steadily more serious efforts to persuade European states, Russia, and the PRC to limit arms transfers to Iran. The U.S. has put heavy pressure on Germany to limit its transfers of dual-use items, and has been joined in such efforts by Britain. The European Community strengthened its controls in June, 1993, and began to examine additional sanctions.[63]

Iran has reacted by trying to buy Western spares on the black market. It has used the complex mix of overt and covert purchasing offices it began to establish after the U.S. placed an embargo on arms shipments in 1980, and which it built up into a highly sophisticated structure during the Iran-Iraq War. Iran's Golden Lawell (Hong Kong), State Procurement Organization, Aviation Technology Affairs (ATA), Foreign Procurement Management Center, Defense Support Organization (Saziman Poshtiban Defa), Ghoods Research Centre, Lavson Ltd., National Iranian Oil Company (NIOC), and their fronts and subsidiaries are particularly important components of Iran's covert purchasing system.

Iran has had some success in using these organizations to buy older U.S. equipment it can cannibalize to repair Iranian equipment. It has also used these organizations to get high technology components like radar testing devices, navigation and avionics equipment, fiber optics, logic analyzers, high speed computers, high speed switches, precision machinery, jet engines, tank engines, and remote sensors. It has aggressively sought out chemical protection and detection gear, refueling technology, early warning radar technology, and avionics conversion equipment -- although it is not clear it has been able to deploy such equipment in its forces.

In spite of all these efforts, Iran has still made only limited overall progress in making its more sophisticated Western-supplied weapons fully operational and in giving them sustainability in extended combat. Iran's former Minister of Defense and Armed Forces Logistics, Akbar Torkan, made this clear in a speech in 1992. He stated that Iran's total annual investment in military imports was closer to $705 million than $2 billion, and described Iran's procurement priorities as,

> "The first priority is spare parts, the second priority is spare parts, and the third priority is spare parts...Only a very few countries, such as America, Russia, China, and France can produce all their requirements. The rest only produce a fraction. It might be possible for us to build tanks, submarines, missiles, aircraft, and the like. But, self-sufficiency is relative. We think of self-sufficiency in terms of those items which we use a lot, especially the sort of equipment we employed most during the Iran-Iraq War. And in any economic venture, the finished product is very important. For instance, if we followed a program of self-sufficiency and decided to produce

something locally it might cost $5,000, whereas we might be able to buy the same thing abroad for $1,000. This would not make economic sense." [64]

Iran's Military Industries

Iran may be more successful in redesigning much of its infrastructure for dual-use in military operations. This includes a plan to build 21 new airports for a total of 63, and to modernize its airport facilities. It also includes a plan to buy a modern digital telephone and telegraph system, with fiber optics capability, that will be directly integrated into its military C^3I net.[65]

Iran is also rebuilding and expanding its military industries, which the Shah first began to expand in 1970.[66] It seems to be spending about $200-$300 million a year in manufacturing conventional arms in Iran, and a larger amount in missiles and weapons of mass destruction.[67] According to Akbar Torkan, its Minister of Defense and Armed Forces Logistics, it has merged its plants for the Iranian regular army and Revolutionary Guards forces into one system to make them more efficient, and has tripled its output of arms since 1979.

In 1993, Iran had at least 240 state-owned arms plants under the control of the Ministry of Defense and Armed Forces Logistics, Defense Industries Organization, IRGC, and Reconstruction Jihad Ministry. The central direction of these organizations, and their R&D efforts has improved steadily since 1989, when Akbar Torkan became Minister of Defense. These organizations employed about 45,000 people, and planned to expand their operations to a level that would employ 60,000 people within the coming five years.

While Iranian officials have often made grossly exaggerated claims about Iran's domestic arms production capabilities, Iran does have some sophisticated plants, manufacturing equipment, and technology. It also has had recent Soviet, North Korean, People's Republic of China, Israeli, Pakistani, Argentine, Brazilian, Taiwanese, and German help in expanding its facilities.

These plants allow Iran to be nearly self-sustaining in many areas of military production and to move towards the ability to modify and steadily manufacture more sophisticated equipment in the future. Iran can already manufacture some aircraft and armored weapons parts, moderately sophisticated military electronics, wheeled armored vehicles, artillery weapons and parts, artillery and small arms ammunition, short to long-range rockets, small arms, automatic weapons, and mortars. It is trying, with People's Republic of China assistance, to produce parts for its F-4s, F-5s, and F-14s.[68]

Iran's Demographics and Military Manpower

Iran's current military capabilities are heavily influenced by its demographics. Iran is by far the most heavily populated Gulf state, and this gives it a major potential advantage in building up its military forces. At the same time, Iran's manpower base has deep ethnic divisions, and its ability to transform its manpower numbers into military power is severely limited by Iran's economic problems and access to arms imports.

In 1992, Iran had a population of about 61.2 million. This population gave it by far the largest pool of military age manpower of any state in the Gulf, but its composition presents a number of current and future problems. Iran's population is about 51% Persian, 25% Azerbaijani, 9% Kurd, 8% Gilaki and Mazandarani, 2% Lur, 1% Baloch, 1% Arab, and 3% other. Iran has less significant religious divisions than Iraq. It is about 95% Shi'ite Muslim, but has 4% Sunni Muslim, plus 1% Zoroastrian, Christian, Jewish, and Baha'i.[69] Iran does, however, have a wide variety of linguistic groups. Only 58% of the population speaks Persian and Persian dialects, 26% speak some form of Turkic or Turkic dialect, 9% speak Kurdish, and five other linguistic groups total about 7% of the population.[70] This presents problems in military training and communications.

Population growth is also a problem. Iran is one of the few Middle Eastern states to actually promote birth control - reversing Khomeini's position on the issue. This program has had strong support from Rafsanjani, who doubled population planning funding from $75 million to $150 million between 1991 and 1992. Partly because of these birth control efforts, the government estimates that its birth rate has dropped from 3.9% in 1985 to 2.7% in late 1991 - although the CIA still estimated the birthrate as 3.5% in 1992. This still leaves Iran with a population of over 61 million -- with 20% under the age of five, and 45% under the age of 15, and with a total oil income that is about the same in 1992 as it was in 1979. Further, even at Iran's official growth estimate of 2.7% (the real rate is probably in excess of 3%, Iran will have 87 million people by the year 2000 -- more than twice the 37 million people it had when the Shah fell.

Iran's total male manpower pool is about 13,268,000, counting the population from 15-49. The CIA estimates that 7,896,000 males are fit for military service, and that 552,000 reach military age each year.[71] The IISS estimates that there are 3,396,000 males between the ages of 13 and 17, another 2,948,000 between the ages of 18 and 22, and a total of 4,718,000 between the ages of 23 and 32.[72]

Estimates differ sharply regarding the size of Iran's total military manpower. The IISS has estimated that Iran has about 528,000 full time actives in its regular forces, plus 350,000 men in its reserves. It estimates that it has 170,000 men in its Islamic Revolutionary

Guards Corps (Pasdaran Inquilab), 150,000 in its Basij (Popular Mobilization Army), 45,000 in its internal security forces, and around 12,000 men in an Iranian trained and funded Kurdish Democratic Party militia.[73] This would give Iran's military forces a total of 727,000 full time and part time men -- a small fraction of Iran's potential manpower strength.

While one expert estimated in 1993 that Iran's regular active strength was only about 400,000-470,000 men, it did not have estimates for the other portions of Iran's forces. Other sources indicate that the IRGC has a total of about 150,000-200,000 men -- excluding the Basij and other internal security contingents. He estimates that active strength of the Basij has declined sharply since the end of the Iran-Iraq War, and -- under peacetime conditions -- may be as low as 30,000 men.

II. The Iranian Army and Islamic Revolutionary Guards Corps[74]

Iran's land forces have been in a constant state of change since the end of the Iran-Iraq War, and it is difficult to make accurate estimates of their strength. They have suffered from the combined costs of revolution, a Western embargo on arms transfers, and the Iran-Iraq War for nearly decade. Iran's ground forces also took far greater losses during the Iran-Iraq War than the Iranian air force or navy, particularly during the final battles of the Iran-Iraq War. Iran's defeats were so severe that they led to the disintegration of some elements of the Pasdaran and even Iran's main regular army units. They also caused massive losses of weapons and equipment.

While Iran's exact losses are in dispute, it is clear that Iran clearly lost over half of its operational armor between February and July, 1988. Iraq seems to be correct in claiming to have captured some 1,298 Iranian tanks and heavy armored fighting vehicles, 155 other armored fighting vehicles, 512 armored personnel carriers, large amounts of artillery, 6,196 mortars, 8,050 RPGs and recoilless rifles, 60,694 rifles, 322 pistols, 501 pieces of heavy engineering equipment, 6,156 pieces of communications gear, 16,863 items of chemical warfare defense equipment, and 24,257 caskets.[75] The disintegration of Iran's armed forces at the end of the Iran-Iraq War is reflected in the fact that much of this captured equipment showed no sign of combat damage or wear. Much was abandoned in the field, either out of panic or because of supply problems.

The Iranian Army and Islamic Revolutionary Guards Corps Since the End of the Iran-Iraq War [76]

Since its defeat in the Iran-Iraq War, Iran has had to rebuild its land forces from the ground up. This rebuilding has been driven largely by the problem of Iran's equipment losses, and started slowly. Iran only imported about $500 million worth of arms between the August, 1988 cease-fire and May 1989, and only imported about 50 new armored weapons and a little over 200 major new artillery and anti-aircraft weapons during this time. This compares with Iraqi imports worth $1.4 billion during the same period. Iraq also imported over 300 armored weapons, more than 240 artillery and anti-aircraft weapons, more than 100 new surface-to-air missile systems, more than 50 helicopters, and more than 50 combat aircraft.

As has been discussed earlier, however, Iran stepped up its arms imports in late 1989, and took advantage of the fact that Iraq's invasion of Kuwait gave Iran a new respectability that eased its ability to order arms and add oil revenues. Even before this time,

Iran had been able to purchase ammunition, armor, artillery and other weapons from the former Soviet Union, North Korea, People's Republic of China and Austria. It made deals with Czechoslovakia and Rumania to buy tanks and missiles, including Czech T-54 and T-55 tanks, and produced the small arms, mortars, and multiple rocket launchers it needed to replace some of its wartime losses. Czechoslovakia helped Iran to expand its ammunition production, and to manufacture anti-tank and anti-air guided missiles. Iran also assembled SA-7s using parts covertly supplied through Poland by the former Soviet Union.[77]

During 1990-1992, Iran received significant deliveries of artillery from North Korea, China, Bulgaria, and Russia. These deliveries included large numbers of 122mm weapons and M-46 130mm guns. Iran also received large numbers of rocket launchers.[78] Deliveries to date have scarcely given Iran the total equipment strength it had in 1988, much less the level of relative capability in had in 1979. Iran also ran into growing financial problems by mid-1992. Nevertheless, Iran has been able to recover some of its former equipment strength, and obtain enough parts to reduce the rate of attrition in its Western-supplied systems due to age and lack of maintenance.[79]

Given the rate of change in Iran's land forces, it is scarcely surprising that estimates of its current manning, organization, and total equipment are controversial. The IISS estimates a total of 320,000 men, including 250,000 conscripts, for the Iranian regular army and 100,000 actives for the land portion of the Islamic Revolutionary Guards Corps. Other experts feel that land forces totaled 400,000 men in 1994, with around 250,000 men (including about 80% conscripts) in the Iranian regular army, and a total of about 120,000-150,000 in the IRGC and other paramilitary forces. Iran had an unknown number of Russian, People's Republic of China, Pakistani, and North Korean advisors, and possibly some from Syria.

The Current Strength of the Regular Army

According to the IISS, the Iranian regular army had a strength of 12 division equivalents in 1994, and around 40 maneuver brigades. These formations included 4 armored divisions (two with three brigades and two with four brigades, 7 infantry divisions, and one special forces division with four brigades. There seem to be at least two, and probably six, independent maneuver brigades. The independent maneuver brigades seem to include one to two airborne brigades and four special forces brigades, a surface-to-surface missile brigade, and a logistic brigade.[80]

A few experts feel the number of major combat units in Iran's regular army is much larger, with up to 350,000 men, and Iran has a larger number of much smaller formations that include 25-28 divisions and over 100 "brigades" and "regiments". According to these estimates, Iran's divisions were estimated to include 5-6 armored divisions, 3-6 mechanized

divisions, 13-14 infantry divisions, and one special forces division with four brigades. These estimates may combine Iranian regular army and IRGC forces, and confuse some brigade sized formations with divisions.

There is broad agreement that in early 1994, the bulk of the army was deployed in three army sized formations north to south along the border with Iraq. Iran seems to have been able to move some units away from the border since Iraq has concentrated on the domestic threat posed by its Shi'ites in the south and Kurds in the north, but tensions between the central government and the Kurds in the Northwest have forced Iran to maintain strong forces in this sector.

Many of the army's key deployment locations and casernes are the same as during the time of the Shah. They include Zahedan in the southeast; Mashad and Gorgan in the northeast; Tehran, Qazvin, and Sarab in the north-central region, Kharramabad, Isfahan, and Shiraz in central Iran; Orimiyah, Maragheh, and Sanandaj in the northeast, Kermanshah in west-central Iran, and Ahwaz and Shushter in the southeast. army aviation is headquartered at Tehran, Mashhad, and Shiraz. Officer training takes place at the Tehran Military Academy, infantry and armor training takes place at Shiraz, signal training takes place at Tabriz, and missile and aviation training takes place at Isfahan.[81]

While estimates of the Iranian army's equipment holdings in 1994 are exceptionally uncertain, the holdings of the Iranian regular army are somewhat better known than those of the holdings of the Islamic Revolutionary Guards Corps. The Iranian regular army seemed to have an inventory of 950-1,000 tanks -- reflecting a rise of some 120-180 tanks over the year before. Some experts, however, rate Iran's operational tank strength as only 700-800. These main battle tanks consisted of about 300 M-47s and M-60s, 150 Chieftains, 200 T-62s and T-72s, and the rest were T-54s and T-55s.

Iran seems to have had about 900 operational armored personnel carriers and armored infantry fighting vehicles. These may have included 40-50 British-supplied Scorpions, more than 200 BMPs, and some 200 M-113s and other Western APCs, and 500 BTR-50s, BTR-60s, and BTR-152s. Iran had an unknown number of British Chieftain bridging tanks.[82]

As has been noted earlier, Iran was actively seeking to expand its tank strength. It appears to have standardized on the Soviet T-72, and seems to want at least 1,500 to 2,000 tanks by the year 2,000. It appears to be trying to modernize its other armored vehicles as well, with an emphasis on converting from armored personnel carriers to armored infantry fighting vehicles.

The army had 2,000-2,500 medium and heavy artillery weapons. This total reflects a continuing Iranian effort to build-up artillery strength that began during the Iran-Iraq War, when Iran used artillery to support its infantry and Islamic Revolutionary Guards Corps in

their attacks on Iraq. Iran has had to use artillery as a substitute for armor and air power. Again estimates differ according to source. Possible holdings include 8-10 M-110 self-propelled and 20-25 M-115 towed 203mm howitzers, 20 M-107 self-propelled 175mm guns, 80-100 M-109 155mm self-propelled howitzers, 40-80 M-59 towed 155mm howitzers and 100-130 M-101 towed 105mm howitzers surviving from the U.S. arms imported during the time of the Shah. It also seems to have 150-175 Austrian GHN-45 and French AMX towed 155mm gun/howitzers.

Iran's non-Western artillery holdings included 1,000-1,500 North Korean and Soviet M-46 towed and PRC-made T-59 towed 130 mm guns; and Soviet, North Korean, Polish, and Czech D-30 122mm gun-howitzers. They included Soviet M-1943 towed 152mm howitzers, at least 20 Soviet 2S1 122mm self-propelled howitzers, Czech Type 83 towed 152mm gun/howitzers, People's Republic of China 122mm towed howitzers, and other former Soviet bloc, PRC, and North Korean towed and self-propelled weapons.[83]

Iran seems to emphasize tube artillery, but it still had roughly 150-200 multiple rocket launchers, including some unidentified 240mm multiple rocket launchers, PRC Type 63 107mm multiple rocket launchers, and Soviet BM-21 122mm towed multiple rocket launchers. It also had Oghab, Shahin, and Nazeat long-range unguided rockets.

Iran bought large numbers of mortars during the Iran-Iraq War, for the same reasons it bought tube artillery weapons. It had some 2,000 weapons in 1994, of which approximately 1,200 were medium and heavy mortars. Iran had mounted at least several hundred of its heavy mortars in armored vehicles -- many of which were M-106 U.S.-made mortar carriers sold to Iran during the time of the Shah. Iran had also actively sought more modern fire control and targeting systems beginning in the mid-1980s, but it is unclear how many it obtained or put in service.

There is no way to estimate the size of Iran's holdings of anti-tank weapons. Iran does have TOW and Dragon weapons supplied by the U.S, and seems to have introduced Soviet and Asian versions of the AT-2 and AT-3 into its forces. It has very large numbers of RPG-7 and Western 3.5" rocket launchers -- perhaps as many as 10,000.

Estimates of Iranian helicopter holdings are equally difficult to make. According to the IISS, the Iranian army retained 100 AH-1J attack helicopters, and 31 CH-47C, 100 Bell-214A, 20 AB-205A, and 50 AB-206 transport and support helicopters supplied by the U.S. and France. Some experts feel these figures over-estimate the number of attack helicopters and under-estimate the number of troop carrying and utility helicopters. Most experts agree that the operational readiness of Iranian helicopters is low, perhaps only about 25% of inventory, and that Iran has little sustained sortie capability. The IISS estimates that army's

fixed wing aircraft included 40 Cessna 185, 310, and O2A aircraft, 2 F-27s, 2 Falcon 20s, 15 PC-16s, and 5 Strike Commanders.

The Current Strength of the Islamic Revolutionary Guards Corps

Most sources agree that the land portion of the Islamic Revolutionary Guards Corps (IRGC) was organized into eleven internal security regions in 1994. Some sources indicate that the Islamic Revolutionary Guards Corps forces were organized into 12-15 "divisions," although most such divisions had manning levels less than those of brigades in the Iranian regular army. The IRGC also had plus 18-23 independent "brigades" -- including armored, infantry, special forces, paratroop, air defense, artillery, missile, engineer, and border defense units. These brigades manning equivalent to regiments and battalions in the regular forces. Some sources put the number of divisions at 30, but this count seems to lump "divisions" and "brigades" together. [84]

Most sources feel the IRGC land forces are largely infantry. There is disagreement, however, over the future role of these forces. The IISS reports the IRGC has 2 to 4 armored "divisions", but it is unclear that the IRGC has any armored formations larger than brigade size, and these units seem far less heavily armored than Iranian regular army armored brigades. A few experts feel that Iran may shift T-72s and similar former Communist bloc armor to the IRGC to create heavy formations that will compete directly with the Iranian regular army in capability. Some other sources feel the IRGC land forces will be kept as largely infantry forces, rather than being upgraded into full armored and mechanized forces, and that it is the Iranian regular army that is getting most of Iran's new heavy weapons. Given the political power of the IRGC, it seems doubtful that it will become a purely internal security force, and it seems likely that it will compete with the army for heavy equipment.

Like the Iranian army, the IRGC possesses numerous anti-tank weapons, including Dragon, TOW, and AT-3 ATGMs, 3.5" rockets, and RPG-7s. It has about 1,500 air defense guns, large numbers of small and man-portable surface-to-air missiles, and increasing numbers of the HN-5 light surface-to-air missiles. Iran's holdings of such weapons are uncertain, but it seems to be importing both PRC and Russian short-range air defense missiles.[85] The IRGC seems to be the principle operator of Iran's land-based surface-to-surface missile forces. Both the Iranian regular army and IRGC have offensive and defensive chemical warfare capabilities.

The Qualitative Capabilities of the Iranian Army and Islamic Revolutionary Guards Corps

The Iranian regular army has learned from the Iran-Iraq War and Gulf War that a reliance on mass, rather than quality, is ineffective. It has sought to give its existing unit strength more armor and artillery, strengthen the firepower and mobility of selected specialized independent brigades, and give its infantry divisions added artillery strength and armored infantry fighting vehicles.

Even so, the Iranian army is short of trained technicians, officers, and non-commissioned officers. Iran is only beginning to rebuild the level of training and discipline it had when the Shah fell. In spite of some recent large scale exercises, it is only beginning to reorganize from a focus on defense in depth against an Iraqi invasion into a maneuver force, and to train a portion of its forces for power projection and amphibious warfare missions. Conscript training is poor to mediocre, junior officer and non-commissioned officer training is poor, and medium to large scale unit training is very poor. Formations differ sharply in size, force mix, and equipment and are difficult to supply and support. Many units are badly under strength, and some combat and support units only have about 65-80% of the strength needed to fully man them.

Some of Iran's units lack the manpower and equipment to be employed in anything other than static defensive battles. Much of the military organization Iran reports on paper has little to do with reality, its high command and logistic system is divided and ineffective, and many Iranian combat units have low overall manpower quality. Logistics, combat engineering, and support capabilities are limited and dependent on reinforcement from the civil sector for any sustained operations. Although Iran is trying to import spare parts and to repair its older Western equipment, it is having only limited success.

Like many of the political or ideological armed forces in the Third World, the IRGC remains an ambivalent force. On the one hand, it is more ideological and better motivated than the bulk of the conscript-dominated Iranian regular army. On the other hand, it often seems to act as an independent force in Iranian politics, its organization is weak, its relatively lightly equipped, and its ideology is a poor substitute for equipment, training, discipline, standardization, and coherent organization. There are some elite IRGC units capable of performing demanding special forces, commando, infiltration, and unconventional warfare missions. The rest of the IRGC force is also becoming more effective, and obtaining better training. This has led some experts to believe that the IRGC, rather than the Iranian regular army, will eventually provide the core of Iran's armored and mechanized forces. While IRGC units have conducted some recent exercises with the land forces that hint that

this could be the case, the weight of expert opinion seems to indicate that the IRGC will remain useful largely for static defense, internal security, and special forces and unconventional warfare missions.

The split between the Iranian regular army and the IRGC helps prevent Iran from concentrating its total mix of land forces into standardized, well manned and equipped, and well-trained land units that can conduct effective armored maneuvers or combined arms operations. While Iran's more recent exercises seem to be part of an effort to correct this situation, they seem to be making limited progress at best and usually seem designed more to intimidate the southern Gulf states and Iraq than to improve military effectiveness.

The Iranian army's overall mix of equipment involves so many different types and generations that it is difficult to support and maintain. There has been little standardization of equipment, and limited to moderate standardization of ammunition and missiles. This has created a wide mix of additional support and service requirements. Iran's land forces have nine types of tanks, seven types of anti-tank missiles, and a wide range of other equipment. Much of this equipment -- particularly the more modern Western tanks and helicopters --is deadlined because of a lack of spares and maintenance skills. Iran's PRC, North Korean, and former Soviet bloc equipment is usually more combat ready, but less sophisticated and less effective.

Iran faces other major challenges in terms of equipment and technology. Most of its tanks lack modern fire control systems, armor, night and thermal vision devices, and guns and ammunition equal to those of the most advanced neighboring states. Sustainability and power projection capabilities are limited, as are battlefield recovery and repair capabilities. Overall night warfare capabilities are limited, and Iran has only limited ability to rapidly move artillery, mass and shift fires, and acquire beyond-visual-range targets. Communications, command and control are obsolete and unreliable. Helicopter and combined operations training with fixed wing aircraft is of very limited quality at best.

Equipment improvements are needed in all these areas, and not simply in a few selected areas like main battle tanks. All of Iran's land force equipment holdings must be modernized or reconditioned to recover from the combined impact of a cut off of Western weapons and equipment, the wear of eight years of war, and the massive losses of 1988. Iran needs a comprehensive tank rebuilding program. It needs to standardize and modernize its other armor. In needs improved tank rounds, remotely piloted vehicles (RPVs) that are integrated into division or brigade level operations, improved mobile short range air defense systems (SHORADs) and man-portable air-to-surface missiles, tank transporters, secure communications, night vision and improved sights, modern fire control systems, and tracked

support equipment and self-propelled artillery. It would greatly benefit from advanced training and simulation technology.

It is unclear that Iran has a well structured plan to create modern standardized armor forces -- perhaps because it still lacks a reliable supplier and/or the funds to make massive integrated purchases from Russia. Its purchases of the T-72 may be step towards this end, but it would take deliveries of a total of around 1,500-2,000 T-72s to meet Iran's needs, even if it retains some Western tanks. Similarly, Iran needs to standardize at least its first line units on Russian designed armored personnel carriers and infantry fighting vehicles. This would require a total of 2,000 relatively modern armored vehicles. Iran will also need self-propelled artillery, improved anti-tank weapons and short-range air defenses, and a much stronger support and logistic training system to support mobile armored warfare and fast moving offensive operations.

This is a major rebuilding program which will be complicated by the need to retrain and restructure to use Soviet-style equipment, and the fact that new equipment deliveries will be at least partially offset by the steady attrition of Iran's remaining Western-supplied systems. Iran is unlikely to meet these objectives by the year 2,000, although it may well be able to raises its total tank strength to from 1,500-2,000 tanks.

The Warfighting Capabilities of the Iranian Army and Islamic Revolutionary Guards Corps

These limitations do not preclude Iran from fighting a weakened Iraq, and Iran would probably be much more capable of successful defensive operations than it was in 1988. Iran is also much better deployed and organized to fight Iraq than it was in 1979, and can conduct limited armored offensives in the Iran-Iraq border area. Given Iraq's diminished strength, it is unlikely that even an Iraqi attack led by the Republican Guards could achieve more than limited initial gains, and the outcome of such an Iraqi attack would be uncertain.

Iran has some land units that should perform well in unconventional warfare missions. It could deploy brigade-sized forces relatively rapidly across the Gulf, if it was allowed to make an unopposed amphibious and air assault. It could intervene in a civil war in Bahrain, or another of the smaller Gulf states, under these conditions.

It is impossible to rule out a sudden or surprise Iranian attack in support of an uprising against a southern Gulf regime that produced success out of all proportion to the size and effectiveness of the Iranian forces deployed. Iranian army forces are also capable of intervening at the brigade and division level in a conflict like the war between Azerbaijan and Armenia, and could easily defeat the Iranian Kurds or any other internal opposition force.

However, if Iran's land forces are to perform more than defensive or limited offensive roles, they must be capable of sustaining large-scale armored thrusts deep into the territory of a well armed power like Iraq, or be capable of at least medium scale amphibious operations. At present, Iran is just beginning to acquire these capabilities, and could do little more than exploit an Iraqi civil war, or rush battalion sized forces to support some coup attempt in an exposed country like Bahrain. In spite of the steady progress Iran has made since its massive defeats in 1988, it is unclear how effective Iran's overall force mix will become during the next decade, and whether Iran's ground forces can ever recover the mix of nationalist and revolutionary fervor they had after Iraq first invaded Iran. It seems unlikely that Iran's land forces will be able to pose significant offensive threat to Iraq during the coming decade, or to the southern Gulf -- if the southern Gulf has Western support.

III. The Iranian Air Force[86]

The current strength of the Iranian air force is as hard to estimate as the strength of Iran's ground forces. While Iran had 85,000 men and 447 combat aircraft in its air force at the time the Shah fell from power, it steadily lost aircraft strength from 1980 to 1988. Like the land forces, the air force has also gone through a decade of revolution, war, and change. The air force suffered combat losses in the Iran-Iraq War. It was cut off from its U.S. suppliers, lost foreign technical support, and was purged of some of the pilots that served under the Shah, and purged of many other officers and technical personnel.

Iran's Air Force After the Iran-Iraq War [87]

Iran ended the Iran-Iraq War with a significant inventory of surviving U.S.-made aircraft, and some excellent sheltered air bases. These included bases at Bandar Abbas, Chah Bahar, Bushehr, Shiraz, Omidiyeh, Ghaleh-Morghi, Isfahan, Dezful, Khatami, Hamadan, Tabriz, Mehrabad, and Tehran. However, only about 60 to 90 of Iran's U.S.-made fighters were operational. These were organized into four fighter ground attack squadrons with 20-35 F-4Es, four fighter ground attack squadrons with 20-45 F-5Es, one interceptor squadron with 10-12 F-14s, and one reconnaissance squadron with five F-5s and three RF-4Es. Although Iran had at least 20 F-4s and 20-40 F-14s in storage, these could only be made operational if Iran got access to Western parts and technical support.

Iran's "operational" aircraft often used awkward mixes of the original aircraft, parts cannibalized from other Iranian aircraft, and parts obtained on the fringes of the international arms market. Most could only fly limited numbers of sorties, and had at least partially non-functional avionics. Their AWG-9 and APQ-120 fire control radars often were not fully operational. Iran's F-14As could not use their Phoenix missiles, and Iran could at most fire only limited numbers the AGM-65 Mavericks that had once been its main air-to-surface guided weapons.

Iran's inventory of U.S. and European supplied air-to-air and air-to-surface guided missiles had aged far beyond its rated life cycle, and presented major problems in terms of reliability and accuracy. In most cases, a major overhaul or rebuild was necessary to give such systems reliability and full combat capability, and in some cases, there was a high probability of failure or mistracking.

Many of Iran's U.S.-supplied radars, Improved Hawk missiles, British-made Rapier squadrons, and Tigercat launch units were unreliable or no longer functioned. Iran's ground-based air defense had become increasingly dependent deliveries of Chinese-made CSA-1s or HQ-23s, variants of the obsolete Soviet-made SA-2. Its only other air defense systems

consisted of a few SA-6s, various versions of the SA-7 man-portable short-range missile, and large numbers of anti-aircraft guns and automatic weapons.

Iran's Current Air Strength: The Search for Spare Parts and New Aircraft

This situation improved significantly between 1988 and 1994. By 1994, the Iranian air force and air defense force built back to a total of around 30,000-35,000 men and a total inventory of around 260-300 combat aircraft. IISS and other estimates indicate that the Air force had 15,000 men and 17 combat squadrons. The IISS estimates these forces included nine fighter ground-attack squadrons, with 4/60 F-4D/Es, 4/60F-5E/Fs, and 1/20 Su-24s. They included seven air defense squadrons, with 4/60 F-14s, 2/30 MiG-29s, and 1/25 F-7Ms. The air force also had a reconnaissance squadron with 5 RF-5s and 3 RF-4Es, and operated 5 P-3F and 1 RC-130 maritime reconnaissance aircraft, and large numbers of transports and helicopters.[88]

Other experts feel that, except for its the F-14 and Su-24 units, the Iranian Air force is organized largely into squadrons that can perform both air defense and attack missions. They also feel that Iran has at least 20-30 F-7Ms and 24-30 Su-24s, several larger reconnaissance squadrons with remotely piloted vehicles (RPVs), and a number of combat-capable training squadrons. What is not clear is the role of the air elements of the IRGC. It was the IRGC that displayed some of the Iraqi fighters that Iran is absorbing into its forces at a recent air show in Tehran, and it is clear that the IRGC is expanding its air capabilities. What is not clear is what combat formations exist, or whether the IRGC will become a direct competitor with the air force.

The air force is based principally at Bandar Abbas, Bushehr, Dezful, Doshan, Tehran (Tapeh, Ghaleh Morghi, Mehrabad), Hamadan, Isfahan, Shiraz, Tabriz, and Zahedan. Fighter attack units were based at Bandar Abbas, Bushehr, Dezful, Mehrabad, Hamadan, and Tabriz. Air defense units were based at Doshan, Tapeh, Mehrabad, and Shiraz. Shiraz provided interceptor training and also was the main base for transport aircraft.[89]

Most sources feel that the future of the Iranian air force will be shaped by its ability to find spare parts for its U.S.-supplied aircraft, and new replacement aircraft. Many of Iran's operational aircraft have only limited capability, few can support sustained sortie rates higher than one every three to four days, and the ability of the avionics on many aircraft to properly fire air-to-air and air-to-surface missiles is uncertain. According to some experts only 3-5 of the F-14s, 20 of the F-4s, and 20 of the F-5s were operational in December, 1992. Others feel that Iran has achieved much higher operational readiness during the last 12-18 months because it has obtained F-4 parts from other countries, and 10-15 F-5s from

Vietnam to use as spares to keep Iran's existing aircraft operational. While Iran has attempted to covertly buy compressor blades for the F-5's engines in the U.K., and to buy surplus F-5s from Indonesia, these efforts failed, and it is unclear that it has been successful elsewhere.[90]

These problems have been fully acknowledged by Akbar Torkan, Iran's former Minister of Defense. He has described Iran's procurement priorities as, "The first priority is spare parts, the second priority is spare parts, and the third priority is spare parts." He also stated that, "Our equipment is mostly American: F-4, F-5, F-14 fighter jets. Our transport aircraft are also American: C-130s, Boeing 747s, and 707s. We have a very good fleet: 14 707s, 12 747s, and 53 C-130s. This should be enough to see us through the next 30 years. ..we have 72 F-14s...for closer support we have F-5 fighters and for deep strikes we have F-4 fighters. This is a very good configuration. We have 750 helicopters. ..Unfortunately, because our fleet is mainly made up of American products, providing spares is very difficult." [91]

There is some debate over the extent to which Iran is obtaining replacement aircraft from the People's Republic of China, from the former Soviet Union, or from other sources. According to some experts, Iran had already imported 30 F-7M fighters from the PRC by mid-1993, out of a possible total order of 50-72, and did not intend to order more PRC-made fighters. This seems to be the logical estimate, since Iran must realize that the F-7M is a marginal copy of the MiG-21, has poor ground attack performance, and has limited air-to-air combat capability against the first line fighters of any potential opponent. Iran has also found -- as Pakistan found earlier -- that the Chinese F-7M fighter is difficult to overhaul.

However, some sources believe that Iran took delivery on over 50 PRC-made F-6 fighters between 1987 and mid-1992, and had nearly 70 PRC-made F-7s in operation by early 1994. A few sources indicate that Iran is modifying its F-7M fighters to use Western avionics at old Iranian Aircraft Industries facilities. The People's Republic of China does seem to have sold Iran 2,500 PL-2 and PL-2A air-to-air missiles (Chinese copies of the Sidewinder) and PL-7 air-to-air missiles (Chinese copies of the Matra Magique R-550).

Iran's most important source of new aircraft has been Russia. Iran's new MiG-29s and Su-24s are far superior in quality to the aircraft it has obtained from the PRC, and may be part of a total order of 50 MiG-29s, and 36 Su-24s.[92] Iran has also ordered the support equipment and training equipment necessary to allow it to rebuild its air force using Soviet equipment and maintain relatively high operational aircraft and training rates.

Iran's MiG-29s are late model MiG-29As or MiG-29Bs. These aircraft are designed for the forward area air superiority and escort mission, including deep penetration air-to-air combat. They also have an interesting mix of strengths and weaknesses. Their flight

performance and flying qualities are excellent, and are roughly equivalent to that of the best Western fighters. They have a maximum take off weight of 39,000 pounds., a maximum afterburner thrust of 18,300 pounds, a flight envelope of 2.35 Mach at 36,000', a thrust to weight ratio of 1.1+, a service ceiling of 56,000 feet, a maximum sustained load or "G" factor of 9, a maximum sea level climb rate of 65,000' per minute, a ferry range of 1,130 nautical miles, a take-off run of 790 feet, and a landing run of 1,970 feet.[93]

The MiG-29 has relatively modern avionics and weapons. The MiG-29 has an advanced coherent pulse-Doppler radar with look-down/shoot-down capabilities that can detect a fighter sized (2 square meter) target at a range of 130 kilometers (70 nautical miles), and track at 70 kilometers (38 nautical miles). It has a track-while-scan range of 80 kilometers (44 nautical miles) against a 5 square meter target and a target file capacity of 10. It is designed to operate with the radar off or in the passive mode, and using ground-controlled intercept.[94]

The MiG-29 has an infrared search and track system collimated with a laser range finder, a helmet mounted sight, internal electronic countermeasure systems, SPO-15 radar warning receiver, modern inertial navigation, and the modern Odds Rod IFF. The range of the infrared search and track system against an F-16-sized target is 15 kilometers (8.2 nautical miles) The maximum slant range of the laser is 14 kilometers (7.7 nautical miles) and its normal operating range is 8 kilometers (4.4 nautical miles). The MiG-29 can carry up to six air-to-air missiles, a 30mm guns, a wide mix of bombs, and 57mm, 84mm, and 240mm air-to-ground rockets. A typical air combat load would include 250 rounds of 30mm gun ammunition, 335 gallons of external fuel, 4 AA-8 Aphid infrared guided missiles, and 2 AA-10 Alamo radar-guided medium-range air-to-air missiles. Iran almost certainly has acquired AA-8, AA-10, and AA-11 Archer air-to-air missiles from Russia.

Even the improved MiG-29B, however, has a number of ergonomic problems. The cockpit frames and high cockpit sills limit visibility. The display is fussy and uses outdated dials and indicators similar to those of the F-4. There is only a medium angle heads-up display and only partial hands-on system control. The CRT display is dated and the cockpit is cramped. On the other hand, the helmet mounted sight allows the pilot to slave the radar, IRST, and HUM together for intercepts and covert attacks using off-boresight cueing.[95]

The Su-24 is a twin seat swing wing aircraft that its roughly equivalent in terms of weight to the F-111, although it has nearly twice the thrust loading, and about one-third more wing loading. The Su-24 can carry payloads of nearly 25,000 pounds, and operate on missions with a 1,300 kilometer radius when carrying 6,600 pounds of fuel. With a more typical 8,818 pound (4,000 kilogram) combat load, it has a mission radius of about 790 kilometers in the LO-LO-LO profiles, and 1,600 kilometers in the LO-HI-LO profile. With

extended range fuel tanks and airborne refueling, the Su-24 can reach virtually any target in Iraq and the southern Gulf.[96]

Although it is not clear what variant of the SU-24 has gone to Iran, it seems likely to be the Su-24D, which includes a sophisticated radar warning receiver, an improved electronic warfare suite, an improved terrain avoidance radar, a bean, satellite communications, an aerial refueling probe, and can deliver electro-optical, laser, and radar-guided bombs and missiles.[97]

These air-to-ground missiles can include up to three AS-7 Kerry radio command guided missile (5 kilometers range), one AS-9 Kyle anti-radiation missile with passive radar guidance and an active radar fuse (90 kilometers range), three AS-10 Karen passive laser-guided missiles with an active laser fuse (10 kilometers range), three AS-11 Kilter anti-radiation missiles with passive radar guidance and an active radar fuse (50 kilometers range), three AS-12 Kegler anti-radiation missiles with passive radar guidance and an active radar fuse (35 kilometers range), three AS-13 Kingposts, and three AS-14 Kedge semi-active laser-guided missile with an active laser fuse (12 kilometers range). It also can carry demolition bombs, retarded bombs, cluster bombs, fuel air bombs, and chemical bombs. U.S. experts believe that Russia has supplied Iran with AS-9, AS-10, AS-11, AS-12, and possibly AS-14 air-to-surface missiles.[98]

Iran's purchase of Soviet aircraft has the major additional benefit of enabling the Iranian air force to use some of the Iraqi aircraft that fled to Iran during the Gulf War. There is some question about the exact number of aircraft involved, and how many are flyable. Some sources report as few as 106 combat aircraft, but Iraq has officially claimed that they total 139 aircraft. A detailed estimate in Jane's Defense Weekly provides the following list of Iraqi aircraft in Iran:[99]

Table IV-1

Iraqi Aircraft Seized by Iran after the Gulf War

From the Iraqi Air Force		From Kuwait Airlines	
24	Mirage F-1		
24	Su-24 Fencer	2	767-200
40	Su-22 Fitter H	1	Airbus A300C4-600
4	Su-20 Fitter C	5	A310-200's
7	Su-25 Frogfoot	2	Boeing 767-200ER
4	MiG-23 Flogger F	2	Gulfstream IIIs
4	MiG-29 Fulcrum	2	BAe 125s
4	MiG-23ML Flogger G		
1	MiG-23U Flogger C	14	Total
112	Subtotal		
2	Boeing 747's		
1	Boeing 707		
2	Boeing 737's		
1	Boeing 737 ?		
5	Airbus 310's		
1	Airbus 300		
15	IL-76's		
2	Mystere Falcon 20		
3	Falcon 50's		
1	Lockheed Jetstar		
33	Sub-Total		
148	GRAND TOTAL		

The author's estimate, based on conversations with various experts, is similar to the estimates in Jane's: 24 Mirage F-1s, 22 Su-24s, 40 Su-22s, 4 Su-17/20s, 7 Su-25s, 4 MiG-29s, 7 MiG-23Ls, 4 MiG-23BNs, 1 MiG-23UB, and 1 Adnan. This is a total of 112 combat aircraft -- the total usually counted by the IISS. The transport and support aircraft include 2 B-747s, 1 B-707, 1 B-727, 2 B-737s, 14 IL-76s, 2 Dassault Falcon 20s, 3 Dassault Falcon 50s, 1 Lockheed Jetstar, 1 A-300, and 5 A-310s. This is a total of 31 aircraft, and would give a grand total of aircraft.[100]

The A-300 and A-310s shown in Table IV-1 are aircraft that Iraq had stolen from Kuwait Airways. Iran agreed to return these aircraft to Kuwait in July, 1992. That same month, however, Iran announced it would not return any of the Iraqi combat aircraft to Iraq. Iran has already begun to fly Iraqi MiG-29s and Su-24s, and is in the process of absorbing all of Iraq's flyable MiG-29s, Su-24s, and Su-20/Su-22s into its force structure. This may give Iran 90 additional combat aircraft if it can obtain suitable support from Russia.

Iran probably cannot operate the Iraqi Mirage F-1s effectively without French technical assistance, which currently seems highly unlikely. The 8-12 Iraqi MiG-23s are sufficiently low in capability so that Iran may be unwilling to pay for the training and logistic burden of adding this type to its inventory. The seven Su-25s are a more attractive option, since they are specially equipped for the close air support mission, but it would be very expensive for Iran to operate a force of only seven aircraft.

Iran's transport assets in 1994 included one tanker/transport squadron with 4 B-707s, and five transport squadrons with 9 747Fs, 11 B-707s, 1 B-727, 20 C-130E/Hs, 3 Commander 690s, 15 F-27s, and 5 Falcon 20As. Its helicopter strength included 2 AB-206As, 39 Bell 214Cs, and 5 CH-47 transport helicopters. It had at least five training squadrons, some with combat capable aircraft. According to the IISS, these combat capable trainers included 5 FT-7Ms, 20 F-5Bs, 5 MiG-29s, 7 T-33s, 45 PC-7s, and 40 EMB-312s.[101]

The War Fighting Capabilities of the Iranian Air Force

The present war fighting capabilities of the Iranian air force are limited. Iran has steadily improved its air combat and exercise training since the end of the Gulf War, and seems to have conducted combined operations exercises with the land forces, land-based air defense forces and naval forces. It can certainly conduct limited air attacks against its neighbors, and can use some precision-guided weapons, chemical weapons, and possibly biological weapons. It could mass a few significant air raids against selected targets in Iraq or across the Gulf.

Possible war fighting uses of the Iranian air force include selective strategic raids on targets in the southern Gulf, attacks on key military depots or bases, attacks on hostile Kurdish camps and the bases of the People's Mujahideen, and attacks on shipping in the Gulf. The Iranian air force could also assist the Iranian land forces in new fighting with Iraq -- where it would probably not be able to win air superiority over the Iranian border area, but could do a much better job of defending Iranian territory than in the Iran-Iraq War. It could assist the naval forces in limited operations in the Gulf, unless it met U.S. or Saudi resistance. The Iranian air force could deploy quickly to a friendly air base in the southern Gulf -- in the event of a coup or other change in the political posture of that state -- but would take 3 to 6 months for Iran to deploy enough support equipment and stocks to support more than limited squadron sized operations from such a base.

The Iranian air force is probably strong enough to deter offensive strikes from any southern Gulf air force, except for the Saudi air force in the event that the Saudi government saw the situation as critical enough to commit major forces. Iran is capable of penetrating the air space of all southern Gulf countries except Saudi Arabia, at least to the extent of conducting selective slash and run attacks. It could probably execute at least one successful surprise attack on a Saudi target before the Saudi air force could fully organize its air defenses. The Iranian air force would not have this capability if the U.S. was actively supporting the southern Gulf states.

The Iranian air force could not compete with the Turkish or Pakistani air forces, but might be able to fly combat support and offensive missions over the territory of Azerbaijan or the other former Soviet republics near the Iranian border. Such operations would have to be squadron sized and involve low sortie rates, but Iran has at least some capability.

There is little evidence that Iran can currently sustain high sortie rates for more than one-third to one-half of its combat aircraft for more than a matter of a few days. It also is still organized to fight at the squadron level, and there is little sign that it is organized to fight effectively as a unified air force, using mass and technology effectively in air defense, close air support, or interdiction missions. Iran lacks airborne radars and sensors, and the F-14 is a poor substitute for a true airborne warning and air control system (AWACS) or airborne sensor and battle management system. It lacks the training and sensors to compete with the West in beyond-visual-range combat, and the advanced training facilities to compete in close or dog fight combat.

There are a wide range of areas where Iran needs to improve its technology. These include acquiring some form of "mini-airborne warning and air control system (AWACS)", modern air-to-air missiles to replace its U.S. inventory, modern remotely piloted vehicles (RPVs), improved electronic countermeasure and countermeasure, and airborne refueling

technology. Iran also needs support in repairing and reconditioning its captured Iraqi fighters, in rehabilitating and improving its F-4s, and in recovering the beyond-visual-range air combat capability of its F-14s. It must find ways of integrating its fighters into an effective air control and warning system that "nets" them with its ground-based air defense system, and which avoids the many war fighting limitations over over-dependence on ground-controlled intercepts.

Iran needs to either recondition and improve its RF-4Es and RC-130E/Hs, or acquire modern reconnaissance and intelligence aircraft. It also needs to work with the army to recondition and improve the sensors and weapons on its AB-206B and AH-1J attack helicopters and recondition its force of transport helicopters. It needs the spares, support organization, and training to greatly improve its sortie rates and sustainability, and some additional air bases for dispersal purposes to reduce its vulnerability.

Iran is clearly seeking to obtain first line air defense and long-range strike fighters, and to rebuild a high technology air force that can both provide effective air defense and the ability to strike deep into Iraq, the southern Gulf states, and any other neighboring power. Timing will be critical. Iran has only a limited current prospect of keeping its U.S.-supplied aircraft operational much beyond the late 1990s, and may find it difficult to convert to Soviet fighters fast enough to offset its losses of U.S. types. Iran might, however, be able to achieve near parity with Iraq by the late 1990s, if Russian deliveries to Iran continue and Iraq continues to face an embargo on all shipments of aircraft, parts, and air munitions.[102]

At some point, Iran must make a clear decision between a hybrid air force and one dependent on Russian aircraft. Reliance on aging U.S. aircraft presents obvious risks, and there are no near-term prospects that the U.S. will relax its constraints on parts and new equipment. An Iranian air force based on Russian attack aircraft like the Su-24 and Su-27, advanced Russian air-to-surface weapons like the AS-9, AS-10 and AS-14, air defense aircraft like the MiG-29 and MiG-31, and air-to-air missiles like the AA-8, AA-10 and AA-11 could be quite effective. Such an air force would take 5-8 years to create, however, and would be extremely costly. It would also confront the risk of supply problems with Russia.

Iran will probably succeed in replacing its U.S.-supplied aircraft on at least a 1:1 basis, and in absorbing its better Iraqi fighters. Beyond that, it is unlikely to be able to substantially expand its combat effective air strength before the year 2000. Its deliveries of Soviet aircraft will take time to assimilate and Iran will inevitably lose U.S.-made aircraft from service. Iran's capabilities will probably grow steadily relative to those of Iraq, but continue to lag behind the rate of modernization in Saudi Arabia. Iran has no foreseeable near to mid-term hope of challenging a combination of U.S., British, and Saudi air power.

The key uncertainties in such predictions are the flow of future aircraft deliveries from Russia, Iran's ability to absorb the aircraft it has seized from Iran, and the quality of Russian transfers of smart munitions, spare parts, and support. Iran seems at least half a decade away from rebuilding its air force to the level where it will be an integrated and effective fighting force by Western standards, and it will probably never be able to recover full use of more than half its inventory of U.S. aircraft.

IV.Iranian Ground-Based Air Defenses[103]

Iranian ground-based air defenses play a critical role in shaping Iranian willingness to take risks and use conventional military forces. As long as Iran is vulnerable to the kind of air offensive the U.N. Coalition conducted against Iraq during Desert Storm, it is likely to be restrained in the risks it will take. Much depends, however, on how Iran perceives its vulnerability to air attack and the attrition levels it can inflict on attacking aircraft. This perception will be shaped in part by Iran's ability to modernize its fighter forces, but Iran has no near-term prospect of acquiring an air borne defense platform similar to the E-3A airborne warning and air control system (AWACS) operated by the Saudi and U.S. air forces, or match the West in airborne electronic warfare capabilities. Iran's success in modernizing its ground-based air defenses will, therefore, probably be as important in influencing its willingness to take military risks as its acquisition of aircraft.

Iranian Ground Based Air Defenses Since the Iran-Iraq War

Like its other services, the strength and capability of Iran's land-based air defense forces improved significantly during 1988-1994. In 1994, the total manpower assigned to land-based air defense functions seem to have included about 4,000-6,000 regulars and 5,000-8,000 IRGC personnel.

It is not possible to distinguish clearly between the major air defense weapons holdings of the regular air force and IRGC, but the air force seems to operate most major systems and their total holdings seem to have included 30 Improved Hawk fire units (90+ launchers), 50-60 SA-2 and HQ-23 or CSA-1 launchers (PRC-made equivalents of the SA-2), 20-30 SA-6 launchers, and three Soviet-made SA-5 units with at total of 10-15 launchers.

Iran's holdings of lighter air defense weapons included 30 Rapier fire units in five squadrons, 10-15 Tigercat fire units, and a few RBS-70s. They also included large numbers of man-portable SA-7s, HN-5s, SA-14s; some SA-16s, and around 2,000 anti-aircraft guns -- including some Vulcans and 50-100 radar-guided and self propelled ZSU-23-4 weapons.[104] It is not clear which of these weapons were in the army, the IRGC, and the air force. The IRGC has some Stingers, which it obtained from Afghanistan, and almost certainly has a number of other light air defense weapons as well.

During the Iran-Iraq War, Iran's major surface-to-air missiles were redeployed to cover the Iraqi border, its major cities, and its ports in the Gulf. There are no authoritative data on the deployment of its air defenses in 1994, but Iran seems to have deployed its new SA-5s to cover its major ports and Tehran, and concentrated its Improved Hawks and

Soviet and PRC-made SA-2s around Tehran, Isfahan, Shiraz, Bandar Abbas, Kharg Island, Bushehr, Bandar Khomeini, Ahwaz, Dezful, Kermanshah, Hamadan, and Tabriz. At the same time, Iran lacked the missile strength, low altitude coverage, and command and control assets, sensors, and systems integration capability necessary to create an effective air defense net. Its missiles and sensors gave it the equivalent of a point defense system, which was most effective at high to medium altitudes against aircraft with limited penetrating and jamming capability

Many of the Western-supplied surface-to-air missiles in Iran's order of battle were not fully operational in 1994, and Iran sometimes had to rely on crudely integrated radars and inadequate data processing systems and command and control links.[105] Iran also lacked an effective Western system to build-upon. It had never made its air control and warning system fully operational under the Shah and had experienced serious problems in operating some of its largely British-supplied radars. Once the Shah was deposed, its Western-supplied radars, communications system, and software could not be improved or properly maintained. It also lost many of Western-trained operators, technicians, and commanders, and its ability to use its Western-supplied equipment effectively. Iran had only minimal capability to fight a large scale air war or maintain an effective air defense system.[106]

The air force has gotten recent deliveries of the PRC-made CSA-1 missile, SA-6, and SA-5 and is seeking Soviet warning and battle management radars, command, and communications equipment. It has deployed the SA-5 to several of its bases on the Gulf coast, including Bandar Abbas, and has obtained some new Soviet radars as part of the sale of SA-5 missiles.

These deliveries can scarcely give Iran an effective air defense system, but there are reports from the People's Mujahideen that Iran is seeking to import three more batteries of SA-5 missiles from the former Soviet Union, more CSA-1s, and further deliveries of Soviet or People's Republic of China radars. There are reports from Czechoslovakia that it might sell Iran an advanced mobile air surveillance system called Tamara, whose manufacturer -- Tesla Pardubice -- claims is capable of tracking stealth aircraft. Tamara, however, seems to be a signals intelligence system with some air defense applications. [107]

The most significant reports, which seem to be accurate, indicate Iran is seeking to buy the advanced SA-10 heavy surface-to-air missile/anti-tactical ballistic missile systems from Russia, and a next generation warning, command, and control system. The SA-10 (variously named the Fakel 5300PMU or Grumble) has a range of 90 kilometers or 50 nautical miles. It has a highly sophisticated warning radar, tracking radar, terminal guidance system and warhead, and has good electronic warfare capabilities. The SA-10 is a far more advanced and capable system than the SA-2, SA-3, SA-5, or SA-6.[108]

The Warfighting Capabilities of Iran's Ground-Based Air Defenses

The kinds of transfers of surface-to-air defense systems that Iran has received from Russia and the People's Republic of China have helped to preserve Iran's capabilities, but they are not adequate to meet its needs. Iran needs to rehabilitate and improve its radar-guided anti-aircraft guns and most of its short-range air defense systems. It should either modernize or replace its Rapiers, Tigercats, and FM-80s, and it should replace its obsolescent patch work system of radars and command and control equipment.

Iran cannot, however, develop effective war fighting capabilities with piecemeal improvements. The key to success will be to acquire an advanced heavy surface-to-air missile system with the range, energy of maneuver, sensors, software, and electronic warfare capability to attack even advanced strike and air defense aircraft. In the short term, Iran needs to find a reliable source of Hawk parts to make its current missiles functional, but neither such parts or further purchases of SA-2 and SA-5 systems can give Iran the capabilities it really needs. Both the SA-2 and SA-5 are highly vulnerable to active and passive countermeasures, and the Improved Hawk does not approach the Patriot in performance capability. Iran needs a modern heavy surface-to-air missile system that is part of an integrated air defense system.

This is a difficult challenge for Iran to meet. No European or Asian power can currently sell Iran an advanced ground-based air defense system, or an advanced heavy surface-to-air missile system. The U.S. and Russia are the only suppliers of such systems, and the only options are the Patriot, SA-10, SA-12a and SA-12b. Iran will not get the Patriot systems from the U.S., but Iranian acquisition of the SA-10 or SA-12 and an advanced integrated Russian command, control, and electronic warfare system is a serious possibility.

Much will depend, however, on the nature of the sale and the scale of Russian assistance. Russia is certainly capable of selling Iran the SA-10 or SA-12, a greatly improved early warning sensor system, and an advanced command and control system for both its fighters and land-based air defenses. Such a system would be somewhat experimental in that Russia has not fully completed integration of the SA-10 and SA-12 into its own air defenses, has significant limitations on its air defense computer technology, and relies heavily on redundant sensors and overlapping different surface-to-air missiles to compensate for a lack of overall system efficiency.

A combination of advanced Russian missiles and an advanced sensor and battle management system would not be immune to active and passive attack by the U.S. It would,

however, greatly complicate the problem of using offensive U.S. air power against Iran, require substantially more U.S. forces to conduct a successful air campaign, and probably greatly increase U.S. losses. It is important to note, however, that it would take at least five years to deploy and absorb such a system once Russia agreed to the sale. Its effectiveness would also depend on the ability of Russia to provide suitable technical training and to adapt a Russian system to the specific topographical and operating conditions of Iran. A Russian system cannot simply be transferred to Iran as an equipment package. It would take a major effort in terms of software, radar deployment and technology -- and considerable adaptation of Russian tactics and siting concepts -- to make such a system fully combat effective.[109]

V. The Iranian Navy and Naval Branch of the Islamic Revolutionary Guards Corps [110]

The Iranian navy, and Naval Branch of the Islamic Revolutionary Guards Corps, are likely to play a critical role in Iranian military action in the Gulf region. Any Iranian intervention in a Gulf state that does not involve the cooperation of a southern Gulf government, and free access to ports and air fields, would require some kind of amphibious operation. Naval forces are essential to a wide spectrum of other possible conflicts that affect the islands in the Gulf, control of the Straits of Hormuz, unconventional warfare using naval forces, attacks on coastal targets in Iraq and the southern Gulf, and Western and southern Gulf naval operations in the Gulf.

Iran has given the modernization of its naval forces a high priority since the end of the Iran-Iraq War. It has stepped up training and exercise activity, bought new missiles and ships, purchased submarines from Russia, and improved its ports and strengthened their air defenses. It has conducted combined arms training exercises with the land forces and air force.

Iranian naval forces still have many limitations, but the military capability of Iranian naval forces cannot be measured simply in terms of whether they can win a battle for sea control against southern Gulf and/or Western forces. Iran's forces are likely to lose any such battle if Western forces are involved for the foreseeable future. It is Iran's ability to use sea power to intimidate its neighbors, to conduct limited or unconventional warfare, or to threaten traffic through the Gulf that gives it the ability to threaten or intimidate its neighbors.

The Iranian Navy and the Gulf War

Like Iran's other military services, the Iranian navy has suffered from the revolution, the Iran-Iraq War, and the Western embargo on arms transfers. The Iranian navy suffered serious damage to at least two of its destroyers during 1980-1986 because of the Iran-Iraq War. By 1986, many of its key combat weapons and sensors ceased to be operational because of a lack of Western re-supply and technical support. The weapons systems and sensors on its Saam-class frigates were only partially operational. It had lost two Kaman-class patrol boats and two more were seriously damaged. Its Kaman-class boats at best retained a few operational Harpoon missiles. The navy had lost two of its Western-supplied minesweepers. Its amphibious was reduced to three marine battalions, four Hengam LSTs,

four ex-Dutch LSMs, and six BH-7 Mark 4 Hovercraft. It had one ocean-going replenishment ship, one repair, and two fleet supply oilers.

Iran's naval encounters with the U.S. during 1987 and 1988 made this situation much worse. On September 21, 1987, the U.S. sank the *Iran Ajar* while it was laying mines in the Gulf. On October 8, 1987, the U.S. sank an IRGC Boghammer and several Boston Whalers. Then on April 18, 1988, the Iranian navy challenged the U.S. navy while the U.S. was attacking several IRGC-occupied oil platforms in response for the mining of the *USS Roberts*. The end result was that the U.S. sank the Iranian guided-missile frigate *Sahand* and the guided missile patrol boat *Joshan*. It crippled another guided missile patrol boat -- the *Sabalan*, and sank another Boghammer and damaged one more.

By the end of the Iran-Iraq War, the Iranian navy had lost significant amounts of its Western-trained personnel from a combination of age, purges, and combat losses. Many of its remaining radar and electronic systems were either no longer operational or had severe reliability and endurance problems. These systems included the Contraves Sea Hunter, SPG-34, and Mark 37, 51, and 61 fire control systems; the WM-28 tactical and fire control radars; the Plessey AWS 1 and SPS6 search radars, and SPS-37 air surveillance radars. Iran had severe shortages in both anti-ship and anti-air missiles such as the RIM-66 Standard (anti-aircraft), Sea Cat (anti-aircraft), and RGM-84 Harpoon (anti-ship). All of the Western missiles in the navy's inventory had exceeded their maximum reliable storage life, and Iran's stocks of Harpoons may have been reduced to seven missiles for its Kaman-class fast attack craft. [111]

Rebuilding the Strength of the Iranian Navy

As is the case with its ground and air forces, however, Iran began to rebuild its naval capabilities shortly after the Iran-Iraq War ended. It obtained missiles from the PRC, some additional ships, midget submarines from North Korea, and submarines from Russia. Iran received significant logistic and technical support from Pakistan.[112]It improved its naval training, acquired additional mine warfare capability, and repaired some of its ships.

In 1994, Iran's regular navy, naval portion of the Islamic Revolutionary Guards Corps, and marines totaled around 38,000 men -- with about 18,000 regulars and 20,000 Iranian Naval Revolutionary Guard forces. While some sources list Iran as having three Marine Brigades, it is not clear how the marine units are structured, trained, or equipped.[113]

While many ships still had limited operational capability, the combat strength of the Iranian navy was impressive by Gulf standards. According to various estimates, Iran's operational inventory included 3 destroyers, 3-5 frigates, 10 missile combatants, 23 other patrol and coastal combatants, 3-5 mine warfare ships, 9 armed helicopters, 10 amphibious

ships and craft. Iran had a small marine force and large numbers of naval revolutionary guards. Iran also had 5-7 Silkworm (HY-2) anti-ship missile sites to defend its ports and cover the Straits of Hormuz.

The main base for the force was Bandar Abbas, the only large Iranian port far enough away from Iraq to be relatively secure from Iraqi air attack during the Iran-Iraq War. This port is the home port of Iran's destroyers, frigates, and Kilo-class submarine. Iran does not conduct extensive patrols in the Gulf of Oman, but does hold occasional exercises there, and is expanding its base at Chah Bahar in the Gulf of Oman. Iran has another large naval base at Bushehr, where it deploys most of its guided missile patrol boats. It has operated hovercraft forces out of the oil port at Kharg Island since the time of the Shah, and has a moderate force at its Western port of Bandar Khomeini, which covers the waters opposite Iraq, and the entrance to the Shatt al-Arab. It has small bases at Bandar Anzali and Noshahr on the Caspian. Noshahr is used for training Islamic Revolutionary Guards Corps forces in unconventional warfare.

Iran's major surface strength included two Sumner-class (Babr-class) destroyers -- the *Babr* and *Palan*g. These ship displace 3,200 tons fully, are capable of speeds of 31 knots, and are armed with four paired elevating Standard SM-1MR surface-to-surface missile launchers, two twin 5" gun mounts, and 6 Mark 32 torpedo tubes, and an Agusta AB 204AS helicopter. The Standard is still a potentially effective missile, with command guidance and semi-active radar homing, and a maximum range of 46 kilometers. Both ships patrol actively, but it is unclear that they can use their anti-ship missiles and anti-submarine mortars effectively. These ships were originally laid down in 1943 and 1944, and have not been refitted since 1971-1972. Their weapons systems, sensors, and equipment are over twenty years old, and all of Iran's Standard missiles have now aged beyond their normal shelf life.

Iran also had one 3,400 ton Battle-class ship called the *Damavand*. The *Damavand* is a British guided missile destroyer that displaces 3,360 tons fully loaded, has a speed of 31 knots, and is armed with four paired elevating Standard SM-1MR surface-to-surface missile launchers, two twin 5" gun mounts, a single Contraves RTN-10X Sea Hunter fire control radar, and a quadruple Sea Cat ship-to-air missile launcher. Like the Babr-class frigates, the *Damavand* had relatively modern air and sea search radars, and modern commercial grade ESM and EW gear, when it was transferred to Iran. Its main refitting, however, took place in 1966, although its missiles were added in South Africa in 1974-1975. Its Sea Cats no longer seem to be operational, and its is unclear whether its Standards and electronics are fully operational. The *Damavand* does not patrol regularly.

Iran had three Vosper Mark 5 Samm-class frigates -- called the *Alvand*, *Alborz*, and *Sabalan*. These are 1,540 ton frigates with maximum speeds of 39 knots, and armed with one five-missile Sea Killer Mark II surface-to-surface missile launcher and one Mark 8 4.5" gun mount each. The *Sabalan* was extensively damaged in combat with the U.S. navy in 1988, during an engagement where the U.S. sank its sister ship the *Sabalan*. It is not clear that it is really operational. The Sea Killer has a relatively effective beam-riding missile with radio command or optical guidance, a maximum range of 25 kilometers, and a 70 kilogram warhead. However, these ships were refitted in 1977, and have not been refitted or modernized since. The operational readiness of their missiles and more sophisticated electronics is uncertain, and there are some indications that Iran may have removed some of the missile launchers and replaced them with a BM-21 multiple rocket launcher to provide added fire support capability.

Iran had two U.S. PF-103 (Bayandor-class) corvettes called the *Bayandor* and *Naghdi* with two 76mm guns. These ships are 900 ton vessels, with maximum speed of 18 knots. They were laid down in 1962, and delivered in 1964. Neither has sophisticated weapons systems or sensors, although one was re-engined and given 20mm guns in place of some of a 23mm gun and depth charge rack in 1988. They are the survivors of a total of four ships -- two of which Iraq sank in 1982.

The rest of the Iranian navy's major combat ships included 10 Combattante II (Kaman-class) fast attack boats armed with four Harpoon or C-801/C-802 missiles and one 76mm gun. These boats displace 275 tons, have maximum speeds of 37.5 knots, and are Iran's most modern Western-supplied combat ships. They were delivered during 1974-1981, and were originally equipped with four U.S. Harpoon missiles. Iran originally had 12, but lost one to Iraq in 1980, and one to the U.S. in 1988. The combat capability of the anti-ship missile systems on the surviving boats is uncertain. Their Harpoons may not be operational, but some or all may have been successfully converted to the C-801/C-802.

Iran also had nine large patrol craft and fast attack craft. These included 1 captured Iraqi Bogomol (possible), 3 North Korean Chaho-class fast attack craft, 3 U.S. Cape-class large patrol craft, and 3 Improved PGM-71-class large patrol craft. These vessels were armed with 23mm to 40mm guns, and the Chaho-class ships also had one BM-21 40 barreled rocket launcher. Most of these craft are operational, and can be effective in patrol missions, but do not have sophisticated weapons systems and have no air defenses other than machine guns and possibly the SA-7.

Iran had 5 BH-7 and 7 SRN-6 Hovercraft. About half of these may be operational. They are capable of speeds of up to 60-70 knots, although normal cruising speed is about half that speed. The BH-7 can carry 53.8 tons of cargo, and the SRN-6 can carry 10 tons.

They are lightly armed and vulnerable, but their high speed makes them useful for many reconnaissance and unconventional warfare missions, and they can rapidly land troops on suitable beaches.

Mine warfare vessels included 2-3 Shahrock-class MSC 292/268 coastal minesweepers (1 used for training in the Caspian Sea). The *Shahrock* and *Karkas* are known to be operational. They are 378 ton sweepers with radars and sonars, but their equipment dates back to the late 1950s. Iran has 1-2 Cape-class (Riazzi-class) 239 ton inshore minesweepers, and seems to have converted two of its Iran Ajar-class LSTs for mine warfare purposes. Many of its small boats and craft can lay mines.

There is no way to determine how many of Iran's smaller ships may have been modified during the Iran-Iraq War to mount extra small arms and/or the Chinese-made C-801 and C-802 anti-ship missiles. However, Iran's lack of a modern long-range anti-ship missile, suitable targeting capability, and competitive electronic warfare capability is a major weakness in war fighting capability. Iran seems to have expended virtually all of its Harpoon missiles during the Iran-Iraq War, and its Standards and the rest of its remaining U.S.-supplied naval, air-to-air, and air-to-surface missiles have now aged well beyond their normal life cycle. Iran does not have a single reliable U.S.-supplied missile in naval or air inventory, and some systems were almost certainly unreliable.

Iran had significant amphibious assets, including four modern Hengam-class (Larak-class) LST amphibious support ships (2,940 tons loaded), 3 Iran Hormuz-class (South Korean) LSTs (2,014 tons loaded) , and 2 Iran Ajar-class LSTs (2,274 tons loaded). Iran also had 3 1,400 ton LCTs, 1 250 ton LSL, at least 6 and possible more than 12 nine ton LCUs, and about 50 small patrol craft. Each Hengam-class ship could carry 227 troops, nine tanks, and one helicopter; each Iran Hormuz-class could carry 140 troops and 8-9 tanks. The Ajar-class could carry 650 tons, but were converted to mine laying These ships gave Iran the capability to deploy about 800 to 1,200 troops, and 30-50 tanks in an amphibious assault, although Iran also had the option of using commercial ships to move substantially larger forces if it could secure transit across the Gulf and a friendly port.

Unlike Iraq, Iran had sufficient support ships to sustain "blue water" operations and support an amphibious task force. It had one Kharg-class 33,014 ton replenishment ship, two Bandar Abbas-class 4,673 ton fleet supply ships and oilers, one 14,410 ton repair ship, two 12,000 ton water tankers, seven 1,300 ton Delva-class support ships, 5-6 Hendijan-class support vessels, two floating dry-docks and 20 tugs, tenders, and utility craft to help support a large naval or amphibious operation.

As the previous descriptions indicate, opinions differ as to how much of Iran's surface force was fully operational in 1994. Iran was clearly able to operate some of its

British-made Saam-class fast attack craft. According to some reports, it could also operate at least one destroyer, two frigates, six to ten fast attack craft (FAC), seven large patrol boats, 40 coastal patrol boats, a maximum of 14 Hovercraft, and 57 amphibious assault ships, logistic ships, and small patrol boats. This would give Iran a total force of more than 80 vessels, although Iran would have only 9-13 major surface ships.[114] It had significant stocks of U.S. Mark 65 and Soviet AMD 500, AMAG-1, and KRAB anti-ship mines, and may have bought PRC-made versions of the Soviet mines. It had claimed to be making its own non-magnetic acoustic free-floating and remote controlled mines.

The Iranian navy's air capability consisted of two to three operational P-3F Orion maritime patrol aircraft out of an original inventory of five. According to reports from the Gulf, none of the surviving P-3Fs had fully operational radars and their crews often used binoculars. It also had up to 12 Sikorsky SH-3D ASW helicopters, two RH-53D mine laying helicopters, and seven Agusta-Bell AB-212 helicopters equipped with Italian-made Sea Killer missiles. It used air force AH-1J attack helicopters, equipped with French AS-12 missiles, in naval missions, and adapted Hercules C-130 and Fokker Friendship aircraft for mine laying and patrol missions.[115]

The naval element of the Islamic Revolutionary Guards Corps in 1994 is sometimes estimated as 20,000 men, but the actual total could be as little as 12,000-15,000. It operated Iran's coastal defense artillery in three to five sites, and each was armed with artillery and CSS-N-2 (HY-2) Silkworm anti-ship missiles. The naval branch of the IRGC also had training facilities and five bases in the Gulf, including the islands of Sirri, Abu Musa, Al Farisyah, and Larak, and the Halul oil platform.

While any such estimates are uncertain, and it is not possible to distinguish between the holdings of the navy and the IRGC, Iran had 47 barges and service craft, 2 floating docks, about 100 coastal patrol craft, 35-40 Boghammer 41 foot craft, 35 Boston Whaler 22 foot craft, and large numbers of river craft. The Naval Guards were definitely equipped with the Boghammer Swedish-built fast interceptor craft, as well as small launches equipped with anti-tank guided missiles, and at least 30 Zodiak rubber dinghies to carry out rocket, small arms, and recoilless rifle attacks. They were also armed with machine guns, recoilless rifles, and man and crew portable anti-tank guided missiles.

The Warfighting Capabilities of the Iranian Navy

In spite of the numerical strength of Iran's naval forces, they face several major challenges in war fighting. Iran was the dominant naval power in the Gulf during the time of the Shah, but only because of British withdrawal from the region and a U.S. alliance with Iran. Iran's attacks on tankers during the Iran-Iraq War brought U.S. navy, British navy, and

other Western forces back into the Gulf, and the U.N. Coalition response to Iraq's invasion of Kuwait made the Gulf a major operating area for U.S. and British naval forces. These shifts confronted Iran with the fact that no modernization of its conventional surface strength offered any practical prospect of allow Iran to challenge a combination of Western and southern Gulf forces.

Iran can only slowly modernize its anti-ship missile capabilities and the air and missile defenses of its surface fleet, and cannot hope to compete in electronic warfare and countermeasure capability. Its air force lacks the ability to provide effective air cover and conduct combined navy and air force operations in the face of Western-supported opposition. While Iran may hope to dominate the small naval forces of the southern Gulf naval forces, it cannot hope to dominate a combination of southern Gulf and Western naval and air forces.

Iran's Submarine Purchases

Iran's response to these weakness has been to seek new weapons and forces to offset the weakness of its major surface forces, and to emphasize unconventional forms of naval warfare. It seems to have purchased or assembled one to three 27 ton midget submarines from North Korea in 1988. These submarines can drive to 300 feet, have a compartment for divers, and can carry two side cargoes of 5 tons or 14 limpet mines. It is unclear, however, that Iran has been able to operate them successfully.[116]

Iran has also obtained larger submarines. U.S intelligence sources indicated in early 1992 that Iran planned to buy 2-3 Soviet Kilo-class submarines from the United Admiralty Sudomeh shipyard in Petersburg at a cost of $600 million each. They indicated Iran might buy several mini-submarines weighing roughly 400 tons, and that Iran planned to begin deploying these forces in late 1992, and would eventually base them at its main naval base at Chah Bahar. They also indicated that Iran had sent crews for training at a Russian controlled naval base in Latvia, and that Iran had purchased the submarines to acquire the ability to threaten tanker traffic in the Gulf and passing through the Straits of Hormuz.

Although some press reports then surfaced that Russia had broken off the deal because of U.S. pressure and Iranian funding problems, Iran succeeded in obtaining at least two of the submarines, with an option to purchase a third. The first Kilo was transferred to Iran in November, 1992, and was commissioned as the Tareq-901. It completed its work-up exercise in the Gulf of Oman in the winter of 1992/1993. The U.S. reacted by sending the nuclear attack submarine *Topeka* into the Gulf as a show of strength. The Topeka was the first U.S. nuclear submarine deployment into the Gulf, and demonstrated the seriousness with which the U.S. took Iran's acquisition of the Kilo.[117] The second Kilo was delivered to Iran in late July 1993.[118]

The Kilo is a relatively modern and quiet submarine which was first launched in 1980. The Iranian Kilos are Type 877EKM export versions that are about 10 meters longer than the original Kilos and are equipped with advanced command and control systems. Each Type 877EKM has a teardrop hull coated with anechoic tiles to reduce noise. It displaces approximately 3,076 tons when submerged and 2,325 tons when surfaced. It is 73.2 meters long, 10.0 meters in beam, and has a draught of 6.6 meters, and is powered by three 1,895 HP generator sets, one 5,900 SHP electric motor and one six-bladed propeller.

Each Kilo has six 530 mm torpedo tubes in the box, and can 12 carry homing and wire guided torpedoes or 30-40 mines. There is a remote SA-10 anti-aircraft launcher with one preloaded missile in the sail, and Soviet versions have 10 SA-16 man-portable surface-to-air missiles stored inside. It has a maximum surface speed of 10 knots, a maximum submerged speed of about 17 knots, a minimum submerged operating depth of about 30 meters, and a maximum diving depth of 300 meters. It has a crew of 45, and a surface cruise range of 3,000-6,000 nautical miles and submerged cruise range of 400 nautical miles -- depending on speed and combat conditions.[119]

While it will take several years for Iran to operate such submarines effectively, they give Iran a way of operating in the Gulf and in the Gulf of Oman that reduces its vulnerability to air and surface attack, and its mini-submarines give it the potential ability to hide in the shallow depths and currents near the Straits. They can be used to fire torpedoes or launch mines near ports or against slow moving tankers long before they can operate effectively against hostile combat ships. Iran has already shown that it can use its helicopters to communicate with its submarines using dipping sonars, and can improve its ability to target the submarines using its shore based radars and patrol aircraft.[120]

Yet, many aspects of the Gulf do not favor submarine operations. The Gulf is about 241,000 square kilometers in area, and stretches 990 kilometers from the Shatt al-Arab to the Straits of Hormuz. It is about 340 kilometers wide at is maximum width, and about 225 kilometers wide for most of its length. Its heat patterns disturb surface sonars, but they also disturb submarine sonars, and the advantage seems to be slightly in favor of sophisticated surface ships and maritime patrol aircraft.

Large parts of the Gulf -- including much of the southern Gulf on a line from Al Jubail across the tip of Qatar to about half way up the UAE -- is less than 20 meters deep. The water is deeper on the Iranian side, but the maximum depth is still only 88 meters, which is located about 30 kilometers south of Qeys Island. This maximum depth is so shallow that there is no point in the Gulf deeper than the length of an SN-688 nuclear submarine, and even the keel to tower height of such a submarine is 16 meters. Even smaller

coastal submarines have maneuver and bottom suction problems, and cannot hide in thermoclines or take advantage of diving for concealment or self-protection.

The Straits of Hormuz are about 180 long kilometers long, but have a minimum width of 39 kilometers, and only the two deep water channels are suitable for major surface ship or submarine operations. Each of these channels is only about 2 kilometers wide. Further, a limited flow of fresh water and high evaporation make the Gulf extremely saline, and create complex underwater currents in the main channels at the Straits of Hormuz -- complicating submarine operations but also complicating detection. There are some areas with considerable noise, but not of a kind that masks submarine noise to sophisticated ASW detection systems of the kind operated by the U.S. and U.K. Further, the minimum depth is 45 meters, and depth makes submarine operations difficult.

Iran will be most effective in operating in the Gulf of Oman and Indian Ocean, although such deployments would expose the Kilos to U.S. nuclear attack submarines, and it is unlikely that they could survive for any length of time if hunted by a U.S. navy air-surface--SSN hunter-killer team. On the other hand, no southern Gulf navy now has advanced detection gear. Saudi Arabia is seeking to upgrade the limited ASW sensors on its Al Madinah-class frigates. Bahrain and the UAE are considering improved ASW assets, but Kuwait and Oman have so far concentrated on other force improvements is not.[121]

The effectiveness of the Iranian Kilos will thus depend heavily on the degree of Western involvement in any ASW operation. If they did not face the U.S. or U.K., the Iranian Kilos could operate in or near the Gulf with considerable impunity. If they do face U.S. and British forces they may be able to attack a few tankers or conduct some mining efforts, but are unlikely to survive extended combat. This makes the Kilos a weapon that may be more effective as a threat than in actual combat. Certainly, they have already gotten the attention of the southern Gulf states and convinced them that they must take Iran more seriously.

Anti-ship Missiles, Unconventional Warfare, and Mine Warfare

Anti-ship missiles, unconventional warfare, and mine warfare offer Iran other ways of compensating for the weakness of its conventional air and naval forces. The Guards have operated Iran's PRC-supplied Silkworm surface-to-ship missiles since they were first delivered during the Iran-Iraq War. The Silkworm is designated the HY-2 or Sea Eagle 2 by the People's Republic of China. It is a copy of the Soviet CSS-N-2 "Styx" missile, and is made by the China Precision Machinery Import and Export Corporation (CPMIEC). It has an 80-90 kilometer range, and a 450 kilogram warhead. It climbs to 145 meters (600') after launch and then drops to a cruise profile at 30 meters (100'). There are two variants. One uses radar active homing at ranges from the target of eight kilometers (4.5 nautical miles).

The other is set to used passive IR homing and a radar altimeter to keep it at a constant height over the water.[122] Iran fired at least eight Silkworms against targets in Kuwait during the Iran-Iraq War, three of which were hits.

In 1994, the Naval branch of the IRGC had three to five operational land-based anti-ship missile units with three to six Silkworm launchers each, and a total of 50-60 missiles. At least some of these units were deployed near Iran's naval base at Chah Bahar, Bandar Abbas, and at Khuestak near the Straits of Hormuz to cover the entrance to the Gulf. These units may be operated with the support of the Iranian navy.

There are reports that Iran is working on a version of the Silkworm with a range of up to 400 kilometers, although it is unclear how such a system could be targeted. The Guards may also have formed a new unit using PRC-supplied C-801 anti-ship and ship-to-ship missiles, and there are reports that Iran is seeking to acquire much longer range anti-ship cruise missiles from the People's Republic of China or former Soviet Union. One source has claimed that Iran has bought eight Soviet-made Sunburst anti-ship missiles from the Ukraine. These are described as supersonic sea skimming systems.[123]

Iran has also obtained 60-100 C-801/C802 or YF-6 missiles from the PRC. These short-range anti-ship missiles are roughly equivalent to the French Exocet, and can be launched from the land, ships, and aircraft. They have a range of approximately 70 kilometers in the surface-to-surface mode, and use J-Band active radar guidance. According to People's Mujahideen and other sources, Iran has also sought to buy more advanced anti-ship missiles from North Korea and China, to buy 8-12 missile patrol boats armed with CS-801 missiles, and possibly to buy PRC-made missile armed frigates. There is no way to know how realistic these reports are, or when such ships and missiles might be delivered. Iran will have to make some such order by the mid-1990s to keep up its present strength. Its older Western-supplied ships cannot be made fully modern and kept operational without a comprehensive refit, which could only be done in Western shipyards.[124]

The naval branch of the Islamic Revolutionary Guards Corps provides one of the largest unconventional warfare capabilities of any maritime force in the world. The naval branch of the IRGC operates many of Iran's fast patrol boats as well as many of its CSS-2 Silkworm anti-ship missiles.[125] It currently operates 32-36 up-engined Boghammer craft (6.4 tons), 35 or more Boston Whaler craft (1.3 tons), and numerous River Roadsted patrol and hovercraft. The Boghammer fast interceptor craft is particularly important to IRGC exercises and operations. It is built by Boghammer Marine of Sweden. It can reach speeds of up to 69 knots, has a range of up to 926 kilometers, and has a 1,000 pound equipment load. The Boghammers and other fast patrol boats are unarmed, but crews can be equipped with heavy machine guns, grenade launchers, and 106 mm recoilless rifles.

The Boghammers, the other smaller fast patrol boats, and light craft like Iran's Zodiacs are extremely difficult to detect by radar in anything but the calmest sea state. Iran bases them at a number of offshore islands and oil platforms, and they can strike quickly and with limited warning. There are key concentrations at Al Farisyah, Halul Island (an oil platform), Sirri, Abu Musa, and Larak, with a main base at Bandar Abbas. The Naval IRGC also has naval artillery, divers, and mine-laying units. It had extensive stocks of Scuba equipment, and an underwater combat center at Bandar Abbas.[126]

The relative role of the IRGC and regular navy is unclear. While some experts had believed they would be merged with the regular navy when Admiral Ali Shamkani was made commander of both forces in 1989, they were still an independent forces in 1994 with their own island bases and a facility at Noshahr Naval Academy on the Caspian Sea. The naval branch of the IRGC may operate some of Iran's 11 U.S. Mark III-class (41.6 ton) and 6-20 U.S. Swift Mark II-class (22.9 ton), 20 operational PBI type (20.1 ton), 3 Sewart type (9.1 ton), and 12 Enforcer type (4.7 ton) coastal patrol craft.[127] The PBI-type has been sighted with crude installations of unguided Tigercats, which has a maximum range of six kilometers.

Both the Iranian navy and the naval branch of the IRGC are also expanding their capability for mine warfare. While Iran has only a limited number of specialized mine vessels, it can also use small craft, LSTs, Boghammers, helicopters, and submarines to lay mines. Iran has a wide range of Soviet, Western, and Iranian-made moored and drifting contact mines. It is almost certainly seeking bottom influence mines as well. If Iran does obtain modern mines, these could be placed in tanker routes, as was done during the Iran-Iraq War, placed near the Straits of Hormuz to deter commercial traffic, used to threaten warships in narrow zones of operation, or placed in the Gulf of Oman -- where sweeping and defensive coverage would be even more difficult than in the Persian Gulf. While such activity would be more a harassment than a war fighting capability, it could be combined with the use of land-based anti-ship missiles, commando raids, and submarine deployments. This would give Iran considerable leverage in terms of a cumulative threat to tanker and other shipping in the Gulf, and one that would be difficult to target, counter, and destroy.

Iran may also have acquired significant stocks of non-magnetic mines, influence mines, and mines with sophisticated timing devices. Such mines are extremely difficult to detect and sweep, particularly when they are spaced at wide intervals in shipping lanes. The southern Gulf states may develop the mine sweeping capabilities to sweep concentrated fields in limited areas, but Iran could use such mines throughout the Gulf, and tanker companies and captains are unlikely to take their ships into harm's way in the face of even limited risks. It is also very difficult to detect and sweep such mines. The U.S. ships

damaged by mines during the Gulf War were all operating in waters that had supposedly been swept, and even the best trained and equipped minesweeping team has serious problems in sweeping non-magnetic mines, large areas with loose mines, and bottom mines or other mines which are timed to activate only after several ships have passed or at fixed intervals.

These new forms of sea power offer Iran the ability to tacitly and actively threaten the flow of oil through the Gulf, and the economic life blood of Iraq and its southern Gulf neighbors. While Iran's surface force cannot hope to challenge the power of the U.S. navy, Iran can use systems like anti-ship missiles, mines, and submarines to at least threaten U.S. freedom of action and ability to deploy vulnerable high value targets like carriers in Gulf waters. Iran can also take advantage of the long shipping routes through the Gulf, and its ability to launch naval or air strikes from positions along the entire length of the Gulf or in the Gulf of Oman. While strategists sometimes focus on "closing the Straits", a bottle does not have to be broken at the neck, and low-level mine and unconventional warfare strikes on shipping that are designed to harass and intimidate may allow Iran to achieve its objectives much more safely than escalating to all-out attacks on the flow of oil.

As for power projection, Iran cannot project power by land without crossing Iraq, but amphibious operations again allow it to post a tacit or active threat to the southern Gulf states, particularly small vulnerable states like Bahrain and the smaller sheikdoms of the UAE. At the same time, Iran can use the Gulf to deploy Revolutionary Guards and other unconventional warfare forces, to supply arms to radical movements in the southern Gulf, and threaten their offshore oil operations, ports, and desalinization facilities.

While these naval threats are not critical in themselves, they cannot be decoupled from Iran's efforts to acquire weapons of mass destruction, and growing ability to escalate to the use of such weapons, or from its use of extremist Islamic movements. Iran's naval efforts cannot be measured simply in terms of conventional war fighting capability against the forces the U.S. can deploy in the Gulf. They must be seen in terms of regional perceptions of both the conventional and unconventional threat posed by Iranian sea power, of the threat posed by the sheer size of Iranian ground forces no matter how difficult they may be to deploy, of the growing strike capability made possible by Iran's Su-24s, and the threat Iran's missiles and weapons of mass destruction pose to any U.S. and Western effort to secure the Gulf.

Much will depend on the extent to which Iran can rebuild the technical base for its navy, and actually moves from largely symbolic actions to effective war fighting capability. To do this, it will need adequate training, anti-ship missiles that are competitive with those of southern Gulf, U.S. and British naval forces, new torpedoes, advanced mines like bottom

and moored influence and smart mines, and better mine laying capability. Iran will need to modernize and expand the coverage of its shore-based missiles, and deploy them in enough locations and mobile enough form to make them more survivable. It badly needs improved C^3I/BM and electronic warfare systems, advanced land-based and surface ship based sensor systems, rebuilding and modernization of its P-3s or the purchase of a replacement, and new or modified air defense and anti-ship missiles and suitable electronics for its surface forces. Iran also needs better or modified naval helicopters, and advanced exercise and training technology.

If Iran is to strike across the Gulf, the Iranian navy and Naval Guards need better night vision and targeting systems for their small craft, additional amphibious ships and hovercraft. Large scale assaults would probably require specially adapted commercial ships with roll-on roll-off capability. Iran would also probably wish to improve the defenses and port capabilities of its islands in the Gulf, adding covered moorings, more advanced sensors, and better air defenses.

It is far too early to determine Iran's ultimate motives in shaping its navy, and to say whether it is seeking defensive capability, leverage over its neighbors and the U.S., or regional hegemony. In fact, its ultimate goals may be determined more by its successes over time, and the strength or weaknesses of other states, than its current intentions. Nevertheless, the developments in the Iranian navy must be seen in a different light from a simple assessment of force strength and the capability to fight conventional naval combat.

VI. Iran's Paramilitary Forces

The current capabilities of Iran's paramilitary forces are difficult to determine. The Islamic Revolutionary Guards Corps have previously been treated as a key component of Iran's combat forces, and this seems more accurate than treating them as paramilitary forces. This leaves two main paramilitary forces: The Basij and the national security forces. The Basij (Mobilization of the Oppressed) is a popular reserve force that is controlled by the Islamic Revolutionary Guards Corps, and which consists largely of youths, men who have completed military service, and the elderly.

During the Iran-Iraq War, the Basij was organized into poorly trained and equipped infantry units which were often used in Iran's human wave assaults. Since the war, the Basij has been restructured into a pool that can be called up in wartime, and up to 500 battalions with about 300-350 men each, which are composed or three companies or four platoons plus support.

The primary peacetime mission of the Basij is internal security, although it is used for civil projects or activities where the regime seeks to mobilize youth for a single task or propaganda purposes. Organized Basij units are equipped with small arms, and can act as a force to secure rear areas or deal with ethnic forces or popular riots. They also, however, act as a potential way of expanding the IRGC in time of crisis and war. There is also a large Home Guard force which serves some of the purposes of the Basij, but which is a static militia force tied to local defense missions.

Iran integrated many of its internal security forces in 1991. They are now part of the Ministry of Interior, and consist of about 45,000 men -- including the former Gendarmerie, other police elements, and border guards. The border guards that are organized as a paramilitary police force with wheeled armored vehicles, light patrol aircraft (Cessna 185/310 and -205 and AB-206s), coastal patrol craft, and harbor patrol craft. It keeps order throughout the rural areas of Iran and deals with ethnic and tribal security problems. It has a regional and regimental organization, but no real military training and equipment other than automatic weapons, mortars, and light anti-tank weapons. A new Tribal Guards force is being formed which may either be part of the Gendarmerie or the IRGC.[128]

These paramilitary forces seem unlikely to offer Iran much advantage in wars against its neighbors, except as a means of providing rear area security and as a pool to draw upon in an extended conflict. Human wave attacks have failed in the past and can only be used in border areas. Iran lacks the equipment to waste on untrained and low quality forces in other combat roles. They do, however, offer Iran improved internal security, and should be

adequate to deal with most ethnic threats. The best trained forces of the People's Mujahideen are a possible exception.

VII. Anti-Regime Threats to Iran

Most of Iran's population, including minorities like the Azeri, seem to support the central government. It may not always be popular, but it does not face broadly based threats of internal violence. Iran does, however, faces two anti-regime threats, other than the possibility of economic and political upheaval. These threats include factions of Iranian Kurds, which fought a prolonged struggle for independence during the first four years of the Iran-Iraq War, and which still launch raids on Iranian forces. They also include the National Liberation Army or People's Mujahideen. Neither movement poses a serious threat at the moment, but both have some military capability.

Iran's Kurds

Iran's 6.5 million Kurds make up approximately 9% of Iran's population of 61.2 million.[129] There were significant military clashes between Iranian Kurdish separatists and Khomeini government during the first four years following the revolution, some of which involved Kurdish forces that Iraq had financed and equipped. Iran's Kurds, however, never became involved in anything approaching the kind of total civil conflict that has threatened the very existence of the Kurds in some areas of Iraq.

This is partly a matter of demography. Iran's Kurds are only one minority out of several minorities in northern Iran. The Azerbaijani minority is much larger and makes up 25% of Iran's population. The Kurds are largely Sunni, while Iran is overwhelmingly Shi'ite, but this has not led to organized religious or ethnic persecution by the government of the kind that has occurred in Iraq and Turkey. As a result, Iran is evidently able to train and arm some of the Iraqi Kurdish refugees that have fled to Iran for possible use against Iraq.

Iran's native Kurds are now divided into pro and anti-regime elements, and most Kurds either support the central government or do not actively support its opponents. These pro-regime elements include the Kurdish Democratic Party (KDP) with a militia of about 12,000 men. Iran also is training and arming Iraqi Kurds, including the Kurdistan Workers Party, which favors complete independence from Iraq. This has led to some friction between Iran and the Iraqi Kurdistan Democratic Party (KDP) and Patriotic Union of Kurdistan (PUK) -- the Iraqi Kurdish groups that now make up the government of the Kurdish enclave in Iraq. Iran seems to be giving aid to anti-Turkish Kurdish groups like the Turkish Kurdistan Workers Party (PKK).[130]

Anti-regime Kurds, including the Kurdish Communist Party, have small anti-regime cadres in Iran. The Democratic Party of Iranian Kurdistan (DPIK) is an anti-regime movement with up to 10,500 part time irregulars. The DPIK advocates a violent effort to

win in independence or autonomy, and it conducts occasional assassination attempts and raids on Iranian targets.

There have been continuing minor clashes between the DPIK and Iranian land forces and internal security forces since the end of the Iran-Iraq War. Iran fired at Kurdish camps across the border in Iraq in April, 1993, and seems to have fired on them since.[131] Iranian intelligence agents have also assassinated DPIK leaders living in Europe.[132] There is little evidence, however, that the DPIK is able to win any significant encounters with central government forces, that it has broad popular support, or that Iran's Kurds are seeking the same kind of separatism or autonomy as the Kurds of Iraq.

The People's Mujahideen

The leading armed anti-regime force is the Iraqi backed National Liberation Army (NLA), which is under the command of the People's Mujahideen Organization of Iran (PMOI) and National Council of Resistance (NCR), and is led by Massoud and Maryam Rajavi. While the NLA has recently claimed to be Washington-based, it has been Iraqi-funded, trained, and equipped ever since 1986. It owes many of its origins to the extreme Marxist Mujahideen e-Khalq, which was originally an anti-Shah underground force and which lost a violent and terrorism-dominated struggle for power that it launched against the Khomeini government during the first few years of the Iranian Revolution.

The People's Mujahideen Organization of Iran (PMOI) and National Council of Resistance (NCR) are not peaceful or legitimate opposition movements. An August 11, 1993 letter by the U.S. State Department stated that the People's Mujahideen Organization of Iran,[133]

> "...is inextricably linked to...its use of terrorism and its aim of seeking the violent overthrow of the Iranian regime...The Mujahideen murdered several American officials in Iran in the 1970s. We cannot ignore this fact, nor can we accept the Mujahideen's attempts to excuse such actions on grounds that some of their organization's leaders were in jail at the time of the attacks. The organization took credit for the attacks, and must bear responsibility. They also supported the occupation of our embassy in Tehran, in which American diplomats were held hostage for over a year."
>
> "Additionally, the Mujahideen's military wing...the National Liberation Army, continues to be based in Iraq and retains the support and financing of Saddam Hussein's regime. The PMOI joined Iraqi forces in the eight year war with Iran. These ties to Iraq have discredited the Mujahideen and NCR in the eyes of many

Iranians, and the organization does not represent a significant political force among Iranians."

The NLA has made many claims to have large military forces, and to have defeated Iranian forces in 1988, and to have captured substantial amounts of Iranian equipment. In fact, it seems to have suffered a major defeat the moment it advanced without Iraqi support, and had to retreat back to Iran after losing more than 1,000 killed and abandoning much of its equipment. It has since been re-equipped by Iraq, and has limited amounts of armor.

It is difficult to separate the fiction in the NLA's claims from reality. Reports in early 1992 that it built-up its forces from 15,000 to 45,000 troops seem grossly exaggerated. Its claims that its forces are led by Maryam Rajavi, and that it has real female generals and female troops, seem little more than propaganda. It does seem to have a total military manpower of about 18,000 people, although this may include some dependents. There seem to be about 7,000 to 12,000 combat personnel, and 3,000 to 6,000 additional personnel in support units. Some of these personnel may be part time or include reserves.

All of the People's Mujahideen forces are Iraqi based and equipped, and largely Iraqi financed. It has two main bases in Iraq, and has some T-54 and T-55 tanks, some other armored vehicles, some artillery weapons, 200-450 mortars (60mm, 82mm, 120mm), 106mm recoilless rifles, some 200 light anti-aircraft machine guns, and SA-7 man-portable surface-to-air missiles.[134]

Iran feels the Mujahideen is a serious enough threat to have used ground troops to attempt to attack its camps during the Gulf War, and to have used its aircraft to strike its main camps in 1992 and 1993. Approximately 8-12 Iranian F-4s and F-5s hit the main People's Mujahideen camp near Baghdad on April 5, 1992. This marked the first Iranian attack on Iraqi territory since the cease-fire in the Iran-Iraq War in 1988.[135] Iran repeated these air raids on May 25, 1993, and sent at least 12 Iranian aircraft against two of the People's Mujahideen camps in Iraq. One base was at Jalat, near Sulaymaniyah, about 55 miles from the border. The other was at Ashraf, northeast of Baghdad -- a camp reported to have between 1,500 and 5,000 guerrillas and the location of an Iraqi-financed broadcasting station. These raids were said to be in retaliation for Mujahideen raids into Iran to disrupt the Presidential elections, and Mujahideen support of Iranian Kurdish rebels during the previous two weeks.

Western journalists who have visited the Mujahideen camps have described them as housing a few thousand poorly-armed guerrillas, and totaling 5,000-7,000 men. They have also reported that the Mujahideen has an Iraqi-financed school and hospital in Baghdad. Inspections of their limited armored repair and maintenance facilities show no signs of activity, and uniforms show no sign of wear.

It is probable that the People's Mujahideen is correct in claiming that it has succeeded in some raids and sabotage, and that it has some support within Iran. It is very unlikely that the group has come close to raising the $45 million over the last three years from Iranian exiles that it claims to have raised. U.S. experts believe virtually all of their funds for the Mujahideen's forces come from Iraq. Most Iranians -- including many in the opposition -- seem to view the People's Mujahideen as an Iraqi-financed front group. [136]

VIII. Iran and Weapons of Mass Destruction

Iran has long sought weapons of mass destruction, and the means to deliver them, although its efforts cannot be compared in scale to those of Iraq. Iran has lacked the resources to finance a massive world-wide purchasing effort, and its revolutionary turmoil has limited its access to foreign technology and the efficiency of its industrial base. Iran has, however, sought long-range missiles, produced chemical weapons, developed biological weapons, and made efforts to acquire nuclear weapons.

Given the limitations of Iran's conventional forces, these efforts are probably the most threatening aspect of Iran's present and future military capabilities. Although Iran already has a significant capability to wage chemical warfare, this capability is not large or lethal enough to pose a major threat to the southern Gulf if the southern Gulf states have the support of U.S. forces. The problem is the future. The threat posed by Iran's weapons of mass destruction could be far more important if Iran acquired more effective chemical weapons, highly lethal biological agents, or even one or two nuclear devices.

It is extremely difficult to put either Iran or Iraq's efforts to acquire such weapons into perspective. Different weapons of mass destruction have very different lethalities and war fighting impacts. It is easy to exaggerate the effects of some weapons and under-estimate the effects of others. While the effects of chemical weapons are reasonably well understood, the effects of biological weapons have only been tested in limited field tests and experts differ over their lethality. The literature on nuclear weapons provides highly detailed estimates of various weapons effects, but many of these estimates are suspect. They are extrapolations from theory and field tests that are far more accurate in measuring blast effects than thermal and radiation effects, the synergistic impact of all the effects of nuclear weapons, and the effect of long-term radiation effects on the ultimate casualty rate.

There is very little literature on the problems Third World countries face in integrating the major research, production, and weaponization efforts necessary to create highly lethal biological, chemical, and nuclear weapons. Far more is involved than having the needed technology and scientific capabilities. The successful production, weaponization, and delivery of weapons of mass destruction requires highly advanced management skills, and highly sophisticated simulation/and or testing capability. This helps explain why much of the literature on proliferation has proved to be a false alarm in exaggerating the ease with which countries can deploy such weapons, or the importance of given technologies.

Weaponization -- loading a biological, chemical, or nuclear device into a bomb or warhead that will work safely, effectively, and reliably -- is a major problem. The issue in war fighting is never the theoretical lethality of a device, but rather how well it can actually perform in combat. To date, Third World countries have only been able to deploy designs that provide a small fraction of the potential lethality of chemical weapons, and there have been no public reports of advanced and highly lethal weapons designs for using biological` agents.

Delivery systems present additional difficulties. It is relatively easy to deal with problems like wind, humidity/rain, temperature, and sun light at line-of-sight ranges, and to use artillery or multiple rocket launchers to fire enough of an agent to be effective even if the warhead design is poor. Beyond-visual-range (BVR) conditions require sophisticated reconnaissance and intelligence system, and very effective warheads, to produce highly lethal effects .

High payload aircraft and cruise missiles present major challenges in terms of developing proven bomb and warhead designs that ensure safety, reliability, accurate targeting and navigation, and the proper dissemination of biological and chemical agents, and height of burst and weather conditions for the use of biological, chemical, and nuclear weapons. Iran and Iraq may be willing to take far more risks in deploying given weapons designs, and use weapons with far less predictable effects, than nations like the U.S. and Russia. Even so, Table XI-1 shows that each type of weapon of mass destruction involves major problems in terms of delivery systems.

These problems are particularly severe in the case of extremely high speed deliver systems like ballistic missiles. Although ballistic missiles have the advantage that they are harder to defend against than aircraft, they also involve major challenges in terms of operational reliability, accuracy, and targeting. It is extremely difficult to disseminate biological and chemical agents effectively within the narrow time window allowed by the closing velocity of a ballistic missile, and the weapons package necessary to do so can use up much of the useful payload of such a missile.

Weaponization of a nuclear device involves major design and manufacturing difficulties in weight reduction and ensuring precisely the right height of burst to get the right effect. The cost and scarcity of nuclear fissile material creates major challenges in terms of the risk a warhead package will fail to explode or a missile will not hit its intended target. Safety is also a major issue, particularly with biological and nuclear devices. The risk of accidents or misfires on friendly territory is very real. The technology to ensure safety and arming of a warhead only after a missile has performed properly on launch is complex and involves further weight penalties. No technology currently exists that can reliably disarm a

missile warhead by remote command, or on a fail-safe basis, once a missile has completed its initial boost phase and apogee.

Another major uncertainty, which is of critical importance to any estimate of the future war fighting capability of Iran and Iraq, is the real-world operational lethality of advanced chemical weapons, toxins, and biological agents. Although experts have made the broad outlines of the debate public, it is impossible to discuss the details of these uncertainties within the limits posed by unclassified data, .

Some experts believe that only limited advances can be made in the operational lethality of chemical weapons because effects are determined by weaponization problems and not by the lethality of the agent per se. Others believe that a combination of advanced nerve agents and advanced weaponization can be far more lethal. There is no way to predict how far Iran and Iraq can improve their agents and weaponization techniques, even in the near-term, although major advances over the kind of chemical weapons Iraq deployed during the Gulf War are remarkably easy to make.

The debate over biological weapons and toxins is somewhat similar in that some` experts seriously question whether such agents can be made into operational weapons with anything approaching their theoretical lethality. At the same time, other experts strongly believe that Iran and Iraq are at, or will soon approach, the level of technology to manufacture and weaponize highly lethal biological agents. They also believe that Iran and Iraq are, at a maximum, three to five years away from weaponizing dry storable agents that are microencapsulated and easier to disseminate, and which could achieve lethalities somewhat similar to those of small nuclear weapons. There is no open-source literature that accurately describes the technical issues involved in this debate, but it has an obvious impact on the future capability of Iran and Iraq.

It is also impossible to provide reliable estimates of the rate of success in proliferation. Success is highly dependent on luck in terms of technology transfer, the skills of a few individuals, and engineering and test capabilities that lead to sudden rapid progress or long delays.

All of these factors complicate another major uncertainty. Weapons of mass destruction change the perceptions of both the attacker and defender in terms of political decisions and war fighting. While much of the discussion of such weapons focuses on casualty and physical damage effects, they have major psychological, political, and tactical effects that may actually be more important. Relative willingness to take risks and deal with the real-world outcome of uncertainty becomes critical. So does the relative value assigned to human life, to the predictability of weapons effects and the nature of retaliation, and to the protection of troops, civilians, and potential target areas.

Weapons of mass destruction can radically change crisis behavior and perceptions of the relative risks of escalation, accepting given levels of conflict, and accepting given types of conflict termination. They also can do so in ways where decision-makers and military commanders at best have limited understanding of the technical capabilities and effectiveness of the weapons involved. They affect the transparency and predictability of war since neither Iran or Iraq have anything approaching the intelligence assets to obtain near-real time data on the actual impact of such weapons, and there simply is too little empirical data to predict either short-term or long-term damage effects.

Table IX-1

The Strengths and Weaknesses of Weapons of Mass Destruction -Part One

Chemical Weapons:

Destructive Effects: Poisoning skin, lungs, nervous system, or blood. Contaminating areas, equipment, and protective gear for periods of hours to days. Forcing military units to done highly restrictive protection gear or use incapacitating antidotes. False alarms and panic. Misidentification of the agent, or confusion of chemical with biological agents (which may be mixed) leading to failure of defense measures. Military and popular panic and terror effects. Major medical burdens which may lead to mistreatment. Pressure to deploy high cost air and missile defenses. Paralysis or disruption of civil life and economic activity in threatened or attacked areas.

Typical Military Targets: Infantry concentrations, air bases, ships, ports, staging areas, command centers, munitions depots, cities, key oil and electrical facilities, desalinization plants.

Typical Military Missions: Killing military and civilian populations. Intimidation. Attack of civilian population or targets. Disruption of military operations by requiring protective measures or decontamination. Area or facility denial. Psychological warfare, production of panic, and terror.

Military Limitations: Large amounts of agents are required to achieve high lethality, and military and economic effects are not sufficiently greater than careful target conventional strikes to offer major war fighting advantages. Most agents degrade quickly, and their effect is highly dependent on temperature and weather conditions, height of dissemination, terrain, and the character of built-up areas. Warning devices far more accurate and sensitive than for biological agents. Protective gear and equipment can greatly reduce effects, and sufficiently high numbers of rounds, sorties, and missiles are needed to ease the task of defense. Leave buildings and equipment reusable by the enemy, although persistent agents may require decontamination. Persistent agents may contaminate the ground the attacker wants to cross or occupy and force use of protective measures or decontamination.

Table IX-1

The Strengths and Weaknesses of Weapons of Mass Destruction -Part Two

Biological Weapons

Destructive Effects: Infectious disease or biochemical poisoning. Contaminating areas, equipment, and protective gear for periods of hours to weeks. Delayed effects and tailoring to produce incapacitation or killing, treatable or non-treatable agents, and be infectious on contact only or transmittable. Forcing military units to done highly restrictive protection gear or use incapacitating vaccines antidotes. False alarms and panic. High risk of at least initial misidentification of the agent, or confusion of chemical with biological agents (which may be mixed) leading to failure of defense measures. Military and popular panic and terror effects. Major medical burdens which may lead to mistreatment. Pressure to deploy high cost air and missile defenses. Paralysis or disruption of civil life and economic activity in threatened or attacked areas.

Typical Military Targets: Infantry concentrations, air bases, ships, ports, staging areas, command centers, munitions depots, cities, key oil and electrical facilities, desalinization plants. Potentially fare more effective against military and civil area targets than chemical weapons.

Typical Military Missions: Killing and incapacitation of military and civilian populations. Intimidation. Attack of civilian population or targets. Disruption of military operations by requiring protective measures or decontamination. Area or facility denial. Psychological warfare, production of panic, and terror.

Military Limitations: Most wet agents degrade quickly, although spores, dry encapsulated agents, and some toxins are persistent. Effects usually take some time to develop (although not in the case of some toxins). Effects are unpredictable, and are even more dependent than chemical weapons on temperature and weather conditions, height of dissemination, terrain, and the character of built-up areas. Major risk of contaminating the wrong area. Warning devices uncertain and may misidentify the agent. Protective gear and equipment can reduce effects. Leave buildings and equipment reusable by the enemy, although persistent agents may require decontamination. Persistent agents may contaminate the ground the attacker wants to cross or occupy and force use of protective measures or decontamination. More likely than chemical agents to cross the threshold where nuclear retaliation seems justified.

Table IX-1

The Strengths and Weaknesses of Weapons of Mass Destruction -Part Three

Nuclear Weapons

Destructive Effects: Blast, fire, and radiation. Destruction of large areas and production of fall out and contamination -- depending on character of weapon and height of burst. Contaminating areas, equipment, and protective gear for periods of hours to days. Forcing military units to done highly restrictive protection gear and use massive amounts of decontamination gear. Military and popular panic and terror effects. Massive medical burdens. Pressure to deploy high cost air and missile defenses. Paralysis or disruption of civil life and economic activity in threatened or attacked areas. High long term death rates from radiation. Forced dispersal of military forces and evacuation of civilians. Destruction of military and economic centers, and national political leadership and command authority, potentially altering character of attacked nation and creating major recovery problems.

Typical Military Targets: Hardened targets, enemy facilities and weapons of mass destruction, enemy economy, political leadership, and national command authority. Infantry and armored concentrations, air bases, ships, ports, staging areas, command centers, munitions depots, cities, key oil and electrical facilities, desalinization plants.

Typical Military Missions: Forced dispersal of military forces and evacuation of civilians. Destruction of military and economic centers, and national political leadership and command authority, potentially altering character of attacked nation and creating major recovery problems.

Military Limitations: High cost. Difficulty of acquiring more than a few weapons. Risk of accidents or failures that hit friendly territory. Crosses threshold to level where nuclear retaliation is likely. Destruction or contamination of territory and facilities attacker wants to cross or occupy. High risk of massive collateral damage to civilians if this is important to attacker.

Source: Adapted by the author from Office of Technology Assessment, Proliferation of Weapons of Mass Destruction: Assessing the Risks, U.S. Congress OTA-ISC-559, Washington, August, 1993, pp. 56-57.

Iran's Long Range Missile Programs

Iran's long-range missile capabilities have expanded steadily since the beginning of the Iran-Iraq War. Iraq began to fire FROG-7s at Iranian positions during the first weeks of the Iran-Iraq conflict, however, and Iran responded by making a major effort to acquire and employ its own long-range unguided rockets. Iran obtained help from the People's Republic of China in manufacturing and assembling copies of Chinese artillery rockets, and made considerable progress. By the mid-1980s, Iran claimed that it had over 100 factories manufacturing some sort of equipment for missiles and rockets, with major production facilities at Sirjan and Isfahan, facilities at Shahroud, a test monitoring facility at Tabas, and a launch facility at Rafsanjan.

Iran succeeded in producing its own version of a Chinese Type-83 artillery rocket, which it called the Oghab. This rocket is manufactured at Semnan, about 185 kilometers east of Tehran, in a factory built with Chinese help and using Chinese tools, technology, and some Chinese parts. It is fired from Mercedes-Benz LA911B trucks, with three rockets per truck. Iran also used Chinese help to develop an "original" design for a long-range rocket, which it called the Iran-130.[137] The Oghab only has a range of 40 kilometers, and lacks the range and/or accuracy to hit anything smaller than large area targets like assembly areas and cities. It has a 70-300 kilogram warhead, and an operational CEP that has proved to be in excess of 1,000 meters at maximum range.[138] Further, Iran has no way to accurately target the Oghab.[139]

Iran has produced a longer range Iran-130, or Nazeat, since the end of the Iran-Iraq War. The full details of this system remain unclear, but it seems to use commercially available components, a solid fuel rocket, and a simple inertial guidance system to reach ranges of about 90-120 kilometers. It is 355mm in diameter, 5.9 meters long, weighs 950 kilograms, and has a 150 kilogram warhead.[140] It has poor reliability and accuracy, and its payload only seems to have be several hundred kilograms.

Since the end of the Iran-Iraq War, Iran has exhibited another large rocket called the Shahin 2. It too has a 355mm diameter, but is only 3.87 meters long, and weighs only 580 kilograms. It evidently can be equipped with three types of warheads: A 180 kilogram high explosive warhead, and another warhead using high explosive submunitions, and a warhead that uses chemical weapons. Both the Nazeat and Shahin are now in service with the regular Iranian armed forces in limited numbers.

Iran has had the Soviet-designed Scud B (17E) guided missile since the early 1980s. The Scud B is a relatively old design and first became operational in 1967. It has a maximum

range of 290-310 kilometers with its normal conventional payload, and a maximum flight time of 325 seconds.[141] The missile is 11.25 meters long, is 85 centimeters in diameter, and weighs 6,300 kilograms, and has a warhead weighing about 1,000 kilograms, of which 800 kilograms are high explosive and 200 are the warhead structure and fusing system.[142] It has a single stage storable liquid rocket engine and is usually deployed on the MAZ-543 eight wheel transporter-erector-launcher (TEL). It has a strap-down inertial guidance using three gyros to correct its ballistic trajectory, and uses internal graphite jet vane steering. It has a warhead that detaches from the missile body during the final fall towards target. This provides added stability and allows the warhead to hit at a velocity above Mach 1.5.[143]

All of Iran's Scuds have been obtained from other countries. Iran's claims during the Iran-Iraq War that it was able to actually manufacture Scuds were false. Iran can assemble parts manufactured by the People's Republic of China and North Korea, but it has failed to demonstrate any capability to produce whole missiles or major assemblies like the booster.[144]

Iran used the Scud against Iraq during the Iran-Iraq War in what came to be known as the "war of the cities." The missile was operated by the Islamic Revolutionary Guards Corps, and it fired approximately 14 Scuds in 1985, 8 in 1986, 18 in 1987, and 77 in 1988. Largely because of geography, these missile attacks initially were more effective than those of Iraq. Although all of Iraq's major cities were comparatively close to its border with Iran, Tehran and most of Iran's major cities that had not already been targets in the war were outside the range of Iraqi Scud attacks.

Iran faced severe war fighting limitations in exploiting this range advantage, however, and these limitations will apply in part to future Iranian attacks on its neighbors using missiles with conventional warheads. A conventional missile warhead produces different blast effects from a bomb. Depending on the size of the warhead and the fusing, however, the damage caused by added velocity is often offset by problems in detonating the warhead at precisely the right height to obtain maximum blast effect. As a result, the average missile strike using a conventional warhead is roughly equivalent in lethality to a single sortie on a single target by an F-4 or any other reasonably capable attack aircraft. -- with the important difference that the warhead cannot be aimed at a specific target, but only at a board area. This makes such missiles largely terror weapons since it requires extremely large volumes of missiles to do real damage to an area target, and there is no practical way that conventionally armed variants of the ballistic missiles available to Iran and Iraq can be aimed successfully at point targets.

During the Iran-Iraq War, Iran lacked the number of missiles needed to sustain frequent attacks and deliver large amounts of high explosives at a given time, and Iraq had

vastly superior air resources it could use as a substitute for or supplement to missile attacks. Further, most Iranian missiles struck outside Baghdad.[145] Even the missiles that did hit inside the city often hit in open spaces, and even direct hits on buildings rarely produced high casualties. Iran never hit any of its proclaimed major targets.

These problems help explain Iran's efforts since the Iran-Iraq War to acquire more Scuds and longer range, more accurate missiles. Iran continued to buy an estimated 200-300 Scud Bs from North Korea between 1987 and 1992, and Israeli experts estimate Iran had at least 250-300 Scud missiles, and at least 8-15 launchers, on hand in 1994.

Since the end of the Iran-Iraq War, Iran has made a major effort to obtain longer range and more accurate missiles, almost certainly for the purpose of delivering weapons of mass destruction. Iran has obtained support from the People's Republic of China in supplying new missiles and in helping Iran to develop its own missile technology and production capabilities. In 1989, Iran bought 150-200 PRC-made CSS-8 missiles and 30-35 launchers, from the People's Republic of China, with ranges of approximately 150 kilometers. There is a broad consensus among experts that Iran has negotiated with the PRC to buy "M-9" and "M-11" missiles or related assembly and production technology, and that these efforts have been partially successful in spite of intense U.S. diplomatic pressure on the People's Republic of China.

The M-11 (RDF-116 or CSS-X-7) is a relatively modern solid fueled missile with a range of 300 kilometers and a warhead of 750-800 kilograms. It uses an 8 X 8 transporter-erector-launcher (TEL), and can be sited, launched, and site cleared far more quickly than the Scud. The M-9 (DF-15 or CSS-X-6) is developmental, but it is a longer range system with a range of 600 kilometers and a warhead of more than 600 kilograms. Both missiles can be used to deliver conventional, chemical, and nuclear warheads, although they are too inaccurate for their conventional warhead to be effective as more than a terror weapon.

The exact status of these M-9 and M-11 missile sales to Iran remains uncertain. The People's Republic of China appears to have tried to have agreed to sell Iran the machinery and technology necessary to produce long-range missiles -- including a propellant plant and guidance systems with technology related to the M-11 and/or M-9. Some experts believe that these technology transfers will eventually give Iran the capability to actually produce a missile with a 1,000 kilometer range. Other experts believe that the People's Republic of China is only providing Iran with the component technology to assemble such missiles, or is only helping Iran in its effort to produce or assemble North Korean missiles.

Iran has already acquired a longer range North Korean missile system -- often referred to as a Scud C. A senior North Korean delegation traveled to Tehran to close the deal on November 29, 1990, and met with Mohsen Rezaii, the commander of the IRGC.

Iran either bought the missile then, or placed its order shortly thereafter. North Korea then exported the missile through its Lyongaksan Import Corporation.

North Korea seems to have completed development of this missile in 1987, after obtaining technical support from the People's Republic of China. While the missile is sometimes called an improved Scud, it seems to be substantially different from the original Soviet Scud B. It seems to be based more on PRC-made DF-61 than a direct development of Soviet technology. It has a range of 500-600 kilometers, a payload of at least 500 kilograms, and relatively high accuracy and reliability. This range would give Iran the ability to strike all the targets on the southern coast of the Gulf. It would allow it to cover all of the populated areas in Iraq, although not the West. It could reach into part of eastern Syria, into the eastern third of Turkey, and cover targets in the border area of the former Soviet Union, western Afghanistan, and western Pakistan.

The sale of this missile presents a major uncertainty in terms of its impact on Iranian war fighting capability because North Korea normally deploys it with a chemical warhead, and probably has biological warheads as well. Neither Russia or the People's Republic of China seem to have transferred the warhead technology for biological and chemical weapons to Iran or Iraq when they sold the Scud missile. This may not be true in the case of North Korea, but such a technology transfer produces few indicators. If Iran has obtained such technology from North Korea, it would be able to deploy far more effective warheads than Iraq could develop before the Gulf War, and would save years of development and testing work in obtaining highly lethal biological and chemical warheads.

Various sources indicate that anywhere from 15 to several hundred of the missiles were delivered to Iran during 1991, and that Iran successfully tested one of the missiles in May, 1991. Iran imported using its B-747s, and seems to have used ships to import others. Iran probably had more than 100 of the longer range North Korean missiles by 1994, although one source reports 170. Iran seems to have an acquisition goal of several hundred by the late 1990s.[146] Iran may have begun to test its new North Korean missiles in mid-May, 1991, firing from a mobile launcher at a test site near Qom about 500 kilometers to a target area south of Shahroud. There are also reports that a unit equipped with the missile may have deployed as part of an Iranian exercise called Saeqe-3 (Thunderbolt 3) in late October, 1993.[147]

Iran also served as a trans-shipment point for North Korean missile deliveries during 1992 and 1993. Some of this trans-shipment took place using the same Iranian B-747s that brought missile parts to Iran. Others moved by sea. For example, a North Korean vessel called the *Des Hung Ho,* bringing missile parts for Syria, docked at Bandar Abbas in May, 1992. Iran then flew these parts to Syria. An Iranian ship coming from North Korea and a

second North Korean ship followed, carrying missiles and machine tools for both Syria and Iran. At least 20 of the North Korean missiles have gone to Syria from Iran, and production equipment seems to have been transferred to Iran and to Syrian plants near Hama and Aleppo.

Some experts feel that Iran, Syria, and possibly Pakistan are cooperating in acquiring and producing a longer range North Korean missile called the No-Dong 1. This is a two-staged liquid-fueled missile, with a range of 1,000 kilometers (620 miles) and 1,750 pound warhead. This missile seems to be nearing final development in North Korea, possibly with substantial aid from military industries in the People's Republic of China. It seems to have undergone flight tests at ranges of 500 kilometers (310 miles) on May 29, 1993. A number of experts believe Syria and Iran will buy major assembly and production facilities for the No-Dong 1, as well as missiles or missile parts. Iran seems to be planning to acquire at least 150 such missiles.[148]

There are a few reports, most of which seem to have been inspired by the People's Mujahideen that describe a much more advanced Iranian program. According to such reports, Iran now has the capability to equip its missiles with Sarin and Lewisite warheads, and is actively involved in assembling a wide range of Chinese and North Korean missiles. These missiles include North Korean Scud Bs and "Scud C" missiles; Chinese Oghab (Fajr 3) and Nazeat (Iran 130) rockets; and the Chinese M-11 (Tondar 68) missile.

There are reports that Iran has at least two rocket and missile assembly plants, a missile test range and monitoring complex, and a wide range of smaller design and refit facilities.[149] The largest plant is said to be a North Korean built plant near Isfahan. This is the center of much of Iran's advanced defense industry, including plants for munitions, tank overhaul, and helicopter and fixed wing aircraft maintenance. Some reports say the complex can produce liquid fuels and missile parts from a local steel mill.

A second plant is said to be located 175 kilometers east of Teheran, near Semnan. This plant is said to be Chinese-built, and to have begun rocket production as early as 1987. It is supposed to be able to build 600-1,000 Oghab rockets per year if Iran can import key ingredients for solid fuel motors like ammonium perchlorate. It is also supposed to produce the Iran-130. Another plant may exist near Bandar Abbas for the assembly of the Silkworm. China is said to have built the plant in 1987, and to be helping the naval branch of the Guards modify the Silkworm to extend its range to 400 kilometers.

The Iranian test range is said to be further east, near Shahroud, along the Teheran-Mashhad railway. A telemetry station is supposed to be 350 kilometers to the south at Taba, along the Mashhad-Isfahan road. All of these facilities are said to be under the control of the Islamic Revolutionary Guards Corps.

These reports are almost certainly correct to the extent that Iran is able to assemble missiles and rockets in knock down kits, and can produce some structural parts and mechanical parts like pumps, hosing, etc. What is unclear is that any of these descriptions of individual facilities are correct, that Iran's plants have the ability to rapidly assemble large numbers of systems, and that Iran has the capability to build whole missiles, produce major components, or allow Iran to design and produce indigenous designs.

It is also impossible to dismiss the possibility that Iran is developing a cruise missile, particularly with foreign assistance. While Iran has no capability to develop and deploy a Tomahawk (TLAM)-like missile, U.S. studies have indicated that Third World nations like Iran and Iraq may be able to build a cruise missile about half the size of a small fighter aircraft and with a payload of about 500 kilograms. The technology for fusing and CBW and cluster warheads would be within Iran's grasp. Navigation systems and jet engines would be a major potential problem.

Current inertial navigation systems (INS) would introduce errors of at least several kilometers at ranges of 1,000 kilometers and there would be a severe risk of total guidance failure -- probably exceeding two-third of the missiles fired. A differential global positioning system (GPS) integrated with the inertial navigation system (INS) and a radar altimeter, however, might produce an accuracy as good as 15 meters. Some existing remotely piloted vehicles (RPVs), such as the South African Skua claim such performance. Commercial technology is becoming available for differential global positioning system (GPS) guidance with accuracies of 2 to 5 meters.

There are many commercially available reciprocating and gas turbine engines that Iran could adapt for use in a cruise missile, although finding a reliable and efficient turbofan engine for a specific design application might be difficult. An extremely efficient engine would be have to be matched to a specific airframe. It is doubtful that Iran could design and build such an engine, but over 20 other countries have most of the needed design and manufacturing skills Airframe-engine-warhead integration and testing would be challenging and might be beyond Iran's manufacturing skills. However, it is inherently easier to integrate and test a cruise missile than a long-range ballistic missile. Further, such developments would be far less detectable than developing a ballistic system if the program used coded or low altitude directional telemetry.[150]

Such cruise missile systems could reach a wide range of targets. A system deployed in Iran's border areas, with only a 500 kilometer range, could cover most of Iraq, eastern Turkey, All of Kuwait, the Gulf coast of Saudi Arabia, Bahrain and most of Qatar, the northern UAE, and northern Oman. A system with a 1,200 kilometer range could reach Israel, the eastern two-thirds of Turkey, most of Saudi Arabia and all of the other southern

Gulf states including Oman. Such a system could also be programmed to avoid major air defense concentrations at a sacrifice of about 20% of its range.

Even without any new ballistic or cruise missile systems, Iran now has the capability to launch significant missile attacks against Iraq, and to hit coastal area targets in much of the southern Gulf. It may well be able to use chemical warheads. The volume of such attacks is likely to be very similar to those Iraq launched during the Gulf War, or against Iran during the "war of the cities." The lethality would depend on the warhead, and much depends on the weaponization technology Iran has gotten from North Korea and/or the People's Republic of China.

Iran lacks long-range targeting capability, and missile systems with the accuracy to attack anything other than area targets. It can pose a major threat in terms of intimidation and popular fear using conventional warheads, but it can only use missiles to destroy military targets, paralyze war fighting capabilities, or destroy particular buildings and facilities, if it has effective chemical and biological warheads.

Iran's missiles would be vulnerable to point defense by the improved Patriot, and large scale attacks could probably be broken up by offensive attacks against the launch facilities by U.S. air power. The U.S. currently, however, has no way to prevent Iran from confronting it with the same "Scud hunt" problems it had during the Gulf War: It would be almost impossible to hunt out and destroy enough of Iran's missile capabilities to halt all attacks. The U.S. might well be forced into deterring Iranian missile strikes by escalating its attacks on other high value Iranian targets.[151]

Iranian Chemical Weapons

Chemical weapons offer both Iran and Iraq a wide menu of possible agents, which can be used individually or in cocktails of different weapons to achieve military and strategic effects. The range of possible agents each country might use is shown in Table IX-2.[152]

Both Iran and Iraq have signed the Geneva Protocols of 1925, prohibiting the use of poison gas. Both nations have also signed the Biological Warfare Convention of 1972, banning the development, production, and deployment or stockpiling of biological weapons.[153] Nevertheless, Iran began work on chemical weapons in the early 1980s, in response to Iraq's use of chemical weapons against Iran. The Islamic Revolutionary Guards Corps, with support from the Ministry of Defense, were put in charge of developing offensive chemical agents, and Iran launched a crash effort during 1983-1984 to purchase massive stocks of chemical defense gear and develop its own chemical agents.

It took time for Iran to produce poison gas. Iran had to covertly obtain substantial outside support, and it took several years to get this support, and the necessary feedstocks.

It is impossible to trace the exact sources of the major components of Iran's chemical weapons program. However, Iran had chemical weapons plants in operation at Damghan and Parchin by March, 1998. and may have begun to test fire Scuds with chemical warheads. Mujahideen sources claim Iran set up a chemical bomb and warhead plant operated by the Zakaria Al-Razi chemical company near Mahshar in southern Iran.

Table IX-2

Major Chemical Agents that May Be In Iranian and Iraq Forces - Part One

NERVE AGENTS: Agents that quickly disrupt the nervous system by binding to enzymes critical to nerve functions, causing convulsions and/or paralysis. Must be ingested, inhaled, and absorbed through the skin. Very low does cause a running nose, contraction of the pupil of the eye, and difficulty in visual coordination. Moderate doses constrict the bronchi and cause a feeling of pressure in the chest, and weaken the skeletal muscles and cause filibration. Large doses cause death by respiratory or heart failure. Can be absorbed through inhalation or skin contact. Reaction normally occurs in 1-2 minutes. Death from lethal doses occurs within minutes, but artificial respiration can help and atropine and the oximes act as antidotes. The most toxic nerve agents kill with a dosage of only 10 milligrams be minute per cubic meter, versus 400 for less lethal gases. Recovery is normally quick, if it occurs at all, but permanent brain damage can occur:

Tabun (GA)
Sarin (GB) - nearly as volatile as water and delivered by air. A dose of 5 mg/min/m^3 produces casualties, a respiratory dose of 100 mg/min/m3 is lethal. Lethality lasts 1-2 days.
Soman (GD)
GF
VR-55 (Improved Soman) A thick oily substance which persists for some time.
VK/VX - a persistent agent roughly as heavy as fuel oil. A dose of 0.5 mg/min/m^3 produces casualties, a respiratory dose of 10 mg/min/m3 is lethal. Lethality lasts 1-16 weeks.

BLISTER AGENTS: Cell poisons that destroy skin and tissue, cause blindness upon contact with the eyes, and which can result in fatal respiratory damage. Can be colorless or black oily droplets. Can be absorbed through inhalation or skin contact. Serious internal damage if inhaled. Penetrates ordinary clothing. Some have delayed and some have immediate action. Actual blistering normally takes hours to days, but effects on the eyes are much more rapid. Mustard gas is a typical blister agent and exposure of concentrations of a few milligrams per meter over several hours generally at least causes blisters and swollen eyes. When the liquid falls onto the skin or eyes it has the effect of second or third degree burns. It can blind and cause damage to the lungs leading to pneumonia. Severe exposure causes general intoxication similar to radiation sickness. HD and HN persist up to 12 hours. L, HL, and CX persist for 1-2 hours. Short of prevention of exposure, the only treatment is to wash the eyes, decontaminate the skin, and treat the resulting damage like burns:

` Sulfur Mustard (H or HD) A dose of 100 mg/min/m^3 produces casualties, a dose of 1,500 mg/min/m3 is lethal. Residual lethality lasts up to 2-8 weeks.
Distilled Mustard (DM)
Nitrogen Mustard (HN)
Lewisite (L)
Phosgene Oxime (CX)
Mustard Lewisite (HL)

CHOKING AGENTS: Agents that cause the blood vessels in the lungs to hemorrhage, and fluid to build-up, until the victim chokes or drowns in his or her own fluids (pulmonary edema). Provide quick warning though smell or lung irritation. Can be absorbed through inhalation. Immediate to delayed action The only treatment is inhalation of oxygen and rest. Symptoms emerge in periods after exposure of seconds up to three hours:

Phosgene (CG)
Diphosgene (DP)
PS Chloropicrin
Chlorine Gas

BLOOD AGENTS: Kill through inhalation. Provide little warning except for headache., nausea, and vertigo. Interferes with use of oxygen at the cellular level. CK also irritates the lungs and eyes. Rapid action and exposure either kills by inhibiting cell respiration or it does not -- casualties will either die within seconds to minutes of exposure or recover in fresh air. Most gas masks has severe problems in providing effective protection against blood agents: Hydrogen Cyanide (AC) A dose of 2,000 mg/min/m^3 produces casualties, a respiratory dose of 5,000 mg/min/m3 is lethal. Lethality lasts 1-4 hours.
Cyanogen Chloride (CK) A dose of 7,000 mg/min/m^3 produces casualties, a respiratory dose of 11,000 mg/min/m3 is lethal. Lethality lasts 15 minutes to one hour.

Table IX-2

Major Chemical Agents that May Be In Iranian and Iraq Forces - Part Two

TOXINS : Biological poisons causing neuromuscular paralysis after exposure of hours or days. Formed in food or cultures by the bacterium clostridium botulinum. Produces highly fatal poisoning characterized by general weakness, headache, dizziness, double vision and dilation of the pupils, paralysis of muscles, and problems in speech. Death is usually by respiratory failure. Antitoxin therapy has limited value, but treatment is mainly supportive:

Botulin toxin (A) Six distinct types, of which four are known to be fatal to man. An oral dose of 0.001 mg is lethal. A respiratory dose of 0.02 mg/min/m^3 is also lethal.

DEVELOPMENTAL WEAPONS: A new generation of chemical weapons is under development. The only publicized agent is perfluoroisobutene (PFIB), which is an extremely toxic odorless and invisible substance produced when PFIB (Teflon) is subjected to extreme heat under special conditions. It causes pulmonary edema or dry-land drowning when the lungs fill with fluid. Short exposure disables and small concentrations cause delayed death. Activated charcoal and most existing protection equipment offers no defense. Some sources refer to "third" and "fourth" generation nerve gasses, but no technical literature seems to be available.

CONTROL AGENTS: Agents which produce temporary irritating or disabling effects which in contact with the eyes or inhaled. They can cause serious illness or death when used in confined spaces. CS is the least toxic gas, followed by CS and DM. Symptoms can be treated by washing of the eyes and/or removal from the area. Exposure to CS, CN, and DM produces immediate symptoms. Staphylococcus produces symptoms in 30 minutes to four hours, and recovery takes 24-48 hours. Treatment of Staphylococcus is largely supportive:

Tear: Cause flow of tears and irritation of upper respiratory tract and skin. Can cause nausea and vomiting:

Chlororacetophenone (CN)
O-Chlorobenzyl-malononitrile (CS)

Vomiting: Cause irritation, coughing, severe headache, tightness in chest, nausea, vomiting:

Adamsite (DM)
Staphylococcus

INCAPACITATING AGENTS: Agents which normally cause short term illness, psychoactive effects, (delirium and hallucinations). Can be absorbed through inhalation or skin contact. The psychoactive gases and drugs produce unpredictable effects, particularly in the sick, small children, elderly, and individuals who already are mentally ill. In rare cases they kill. In others, they produce a permanent psychotic condition. Many produce dry skin, irregular heart beat, urinary retention, constipation, drowsiness, and a rise in body temperature, plus occasional maniacal behavior. A single dose of 0.1 to 0.2 milligrams of LSD-25 will produce profound mental disturbance within a half hour that lasts 10 hours. The lethal dose is 100 to 200 milligrams:

BZ
LSD
LSD Based BZ
Mescaline
Psilocybin
Benzilates

Adapted from Matthew Meselson and Julian Perry Robinson, "Chemical Warfare and Chemical Disarmament," Scientific American, Vol. 242, No. 4, April, 1980, pp. 38-47; "Chemical Warfare: Extending the Range of Destruction," Jane's Defense Weekly, August 25, 1990, p. 267; Dick Palowski, Changes in Threat Air Combat Doctrine and Force Structure, 24th Edition, Fort Worth, General Dynamics DWIC-01, February, 1992, pp. II-335 to II-339; U.S. Marine Corps, Individual Guide For NBC Defense, Field Manual OH-11-1A, August, 1990; and unpublished testimony to the Special Investigations Subcommittee of the Government Operations Committee, US. Senate, by Mr. David Goldberg, Foreign Science and Technology Center, US. Army Intelligence Center on February 9, 1989.

Iran built a poison gas plant at Qazvin, about 150 kilometers west of Tehran. This plant is reported to have been completed between November, 1987 and January 1988. While its cover was that it was a pesticide plant, its true purpose seems to have been poison gas production using phosphorous organic compounds. Efforts to equip the plant to produce V-agent nerve gases, possibly Amiton, were delayed by U.S., British, and German efforts to limit technology transfers to Iran, but acquired such capabilities by 1990.[154]

Iran produced enough lethal chemical agents in small batches, and under laboratory scale conditions, to load some weapons before any of its new major production plants went into full operation.[155] Iran produced sulfur mustard gas and blood agents like hydrogen cyanide, phosgene gas, and/or chlorine gas by 1987.[156] These gas agents were loaded into bombs and artillery shells, and were used sporadically against Iraq in 1987 and 1988.[157]

Iran was just beginning to produce significant amounts of mustard gas and nerve gas by the time of the August, 1988 cease-fire in the Iran-Iraq War, and its use of chemical weapons had little impact on the fighting.[158] Iranian troops could not be trained and equipped to use chemical weapons effectively. Iraqi forces already had vastly superior experience and were scoring major victories along the entire front. It is interesting to note, however, that debates took place in the Iranian Majlis in late 1988 over the safety of Pasdaran gas plants located near Iranian towns, and that Rafsanjani described chemical weapons as follows:

> "Chemical and biological weapons are poor man's atomic bombs and can easily be produced. We should at least consider them for our defense. Although the use of such weapons is inhuman, the war taught us that international laws are only scraps of paper."[159]

Although Iran continues to import suitable equipment and feedstocks, the exact status of Iran's current capabilities is unknown.[160] It is clear, however, that Iran has established a significant chemical weapons production capability of up to 100 tons per year, including mustard gas and dusty mustard gas, phosgene gas, and blood agents like cyanogen chloride or one of the cyanides by 1993. Most experts believe Iran can produce Sarin and Tabun nerve gases, and persistent nerve gas in the form of V-agents. While Iran's chemical warheads for its missiles are probably still of limited to moderate sophistication, it has had time to develop efficient artillery, rocket warheads, and bombs. It probably has storable binary weapons, or will soon introduce them into inventory. [161]

Iran now has significant capability to conduct a chemical war near its borders, to launch limited long-range air raids using chemical bombs, and to use chemical weapons in unconventional warfare. It is also important to understand that these capabilities will grow steadily with time, and they will not be subject to the limitations Iraq experienced during its

initial uses of chemical weapon. While chemical weapons are the least lethal form of weapons of mass destruction, they are still extremely dangerous. Table IX-3 shows that modern nerve gas weapons can have a major war fighting impact. These capabilities could make a major change in another Iran-Iraq War, although it is important to note that Iran has little practical experience in large scale chemical operations and Iraq has a great deal. They also give Iran new capabilities to intimidate the southern Gulf states and deter the West.

Further, chemical weapons do not have to be delivered by missiles or aircraft. As is the case with biological weapons, devices can be smuggled into a target area. Agents can be dispersed by man-portable devices or even grenades. They can be used as terrorist or unconventional warfare weapons for delivery into any building with central air conditioning. A passenger airliner could be used to fly a line and disperse agents as an aerosol. Chemical devices could be smuggled in and detonated in commuter centers, stadiums, or other crowded areas.

The problem Iran faces, however, is that any attributable use of such weapons against the southern Gulf and the West, or any other sophisticated military power like Russia, Israel, or Turkey, might rapidly escalate a conflict, and Iran has little defense capability. Iran lacks an effective air defense system, any missile defenses and the kind of armor and offensive air power that could deter large scale conventional attacks and retaliation. If Iran uses chemical weapons, it could destabilize and/or escalate a conflict in ways in which Iran would face massive conventional retaliation. If Iran was to have any catastrophic success in attacking civilian targets, or Western forces, in the southern Gulf, this raise the possibility of theater nuclear retaliation.

Table IX-3

Typical Warfighting Uses of Chemical Weapons

Mission	Quantity
Attack an infantry position: Cover 1.3 square kilometers of territory with a "surprise dosage" attack of Sarin to kill 50% of exposed troops.	216 240mm rockets (e.g. delivered by 18, 12 tube Soviet BM-24 rocket launchers, each carrying 8 kilograms of agent and totaling 1,728 kilograms of agent.
Prevent launch of enemy mobile missiles: Contaminate a 25 square kilometer missile unit operating area with 0.3 tons of a persistent nerve gas like VX per square kilometer.	8 MiG-23 or 4 Su-24 fighters, each delivering 0.9 ton of VX (totaling 7.2 tons.
Immobilize an air base: Contaminate a 2 square kilometer air base with 0.3 tons of VX twice a day for 3 days.	1 MiG-23 with six sorties or any similar attack aircraft.
Defend a broad front against large scale attack: Maintain a 300 meter deep strip of VX contamination in a front of a position defending a 60 kilometer wide area for 3 days.	65 metric tons of agent delivered by approximately 13,000 155-mm artillery rounds.
Terrorize population: Kill approximately 125,000 unprotected civilians in a densely populated (10,000 square kilometer) city.	8 MiG-23 or 4 Su-24 fighters, each delivering 0.9 ton of VX (totaling 7.2 tons) under optimum conditions.

Source: Adapted from Victor A. Utgoff, The Challenge of Chemical Weapons, New York, St. Martin's, 1991, pp. 238-242 and Office of Technology Assessment, Proliferation of Weapons of Mass Destruction: Assessing the Risks, U.S. Congress OTA-ISC-559, Washington, August, 1993, pp. 56-57.

Iranian Biological Weapons

There are strong indications that Iran is actively developing biological weapons. Rumors of such biological weapons activity surfaced as early as 1982, along with reports that Iran was working on the production of mycotoxins -- a relatively simple biological agent that requires only limited laboratory facilities.[162] These rumors were confirmed by U.S. intelligence sources in August, 1989, when it became clear that Iran was trying to buy two new strains of fungus from Canada and the Netherlands that can be used to produce mycotoxins.[163] German sources indicated that Iran had successfully purchased such cultures several years earlier.

The Imam Reza Medical Center at Mashhad Medical Sciences University and the Iranian Research Organization for Science and Technology were identified as the end users for this purchasing effort, but it is likely that the true end user was an Iranian government agency specializing in biological warfare. Many experts believe the biological weapons effort is under the control of the Islamic Revolutionary Guards Corps, who are known to have tried to purchase suitable production equipment and to have conducted covert operations in Germany and Switzerland that seem to be directly linked to biological weapons research and production.

Iran has conducted extensive research on more lethal active agents like Anthrax, hoof and mouth disease and on biotoxins, and has repeatedly approached various European firms for the equipment and technology necessary to work with these diseases and toxins. Little is known, however, about the exact details of the Iran's effort to weaponize and produce such weapons.

Unclassified sources have identified a facility at Damghan as working on both biological and chemical weapons research and production, and believe that Iran may be producing biological weapons at a pesticide facility near Tehran.[164] Reports also surfaced in the spring of 1993 that Iran had succeeded in obtaining advanced biological weapons technology in Switzerland and Germany. According to these reports, this led to serious damage to computer facilities in a Swiss biological research facility by unidentified agents. Similar reports indicated that agents had destroyed German bio-containment equipment destined for Iran. None of these reports, however, can be verified.

Even the possibility that Iran has biological weapons gives it an enhanced capability to deter and intimidate the southern Gulf and the West. Iran could also make overt use of biological weapons in much the same way it could use chemical weapons, and may have weapons superior to those of Iraq. Iran could also make covert use of such weapons -- which lend themselves to tailored attacks in terms of delay effects and are particularly well

suited to unconventional warfare or "terrorism". Iran is likely to keep its biological warfare capabilities covert and to conceal any production capabilities.[165] This makes it far harder to determine the actual nature of Iran's war fighting capabilities than is the case with chemical and nuclear weapons.

In the mid to long-term, it seems likely that Iran will be able to build a significant production capability for storable encapsulated biological agents. It may encounter continuing difficulties in developing effective ballistic missile warheads, but it should be able to meet the technical challenges in improving its targeting and finding effective ways to disperse agents from cruise missile warheads and bombs. Iran may already have the technology to disperse agents like anthrax over a wide area by spreading them from a ship moving along a coast, or out of a large container smuggled into a city or industrial complex.

It is impossible to do more than guess at Iran's war fighting doctrine for using biological weapons. Its leadership and military planners may even go on acquiring such weapons without making specific plans to use them. As for deterrence, Iran would be subject to the same threat of retaliation as with chemical weapons, and the level of conflict would be more intense and make such retaliation even more likely. Really effective biological weapons would also raise the threshold of escalation to levels closer to theater nuclear combat. The results of a recent study by the Office of Technology Assessment that compared the impact of a 12.5 kiloton nuclear weapon dropped in the center of Washington with the minimum and maximum effect of using a single aircraft to deliver 300 kilograms of Sarin and 30 kilograms of anthrax spores are shown in Table IX-4. They indicate that the nuclear weapon would cover 7.8 square kilometers and produce prompt kills of 23,000-80,000; the nerve gas would cover 0.22 square kilometers and kill 60-200, and the anthrax spores would cover 10 square kilometers and kill 3,000 to 10,000. They also show the comparative lethality of chemical and biological weapons under different operational conditions.

There is a very real danger of exaggerating such threats. The Office of Technology Assessment calculations are extremely scenario, time of day, and weather dependent. The missile data assume a very sophisticated missile warhead. Neither Iran or Iraq may be able to acquire for chemical weapons for 3 to 5 years and they may not be able to acquire such a warhead for a biological weapon for 4 to 6 years. The air delivered data assume optimal delivery in the form of aircraft dispersing the biological and chemical agents in the form of an aerosol line sources. This would be a very vulnerable profile for a plane to fly. They also assume a relatively sophisticated level of targeting and weaponization that is probably beyond the capability of either Iran or Iraq for the next five to ten years, and which some

experts argue is not technically feasible. Further, the data on nuclear weapons minimize the radiation effect of such weapons, and fallout, by assuming an air burst of suitable height.

The data in Table IX-4 are, however, a warning of the potential risks posed by biological weapons.[166] Further, it must be stressed that biological weapons do not have to be delivered by weapons systems. As is the case with chemical weapons, they can be smuggled into a target area. Agents can be dispersed by man-portable devices or even grenades. They are ideal terrorist or unconventional warfare weapons for delivery into any building with central air conditioning. Unlike chemical weapons, biological agents are lethal enough to be dispersed from the roof tops or heights in urban areas, and wet agents can be placed in reservoirs. A passenger airliner could be used to fly a line and disperse agents as an aerosol. Spores can be covertly dispersed in commuter centers, stadiums, or crowded areas and disperse the effects of the agent over wide areas. Under the right weather conditions, ships moving along the coast of crowded areas have been found to be ideal platforms for slowly dispersing anthrax spores.

Table IX-4

The Comparative Effects of Biological, Chemical, and Nuclear Weapons Delivered Against a Typical Urban Target in the Middle East

Using missile warheads: Assumes one Scud sized warhead with a maximum payload of 1,000 kilograms. The study assumes that the biological agent would not make maximum use of this payload capability because this is inefficient. It is unclear this is realistic.

	Area Covered in Square Kilometers	Deaths Assuming 3,000-10,000 people Per Square Kilometer
Chemical: 300 kilograms of Sarin nerve gas with a density of 70 milligrams per cubic meter	0.22	60-200
Biological 30 kilograms of Anthrax spores with a density of 0.1 milligram per cubic meter	10	30,000-100,000
Nuclear:		
One 12.5 kiloton nuclear device achieving 5 pounds per cubic inch of over-pressure	7.8	23,000-80,000
One 1 megaton hydrogen bomb	190	570,000-1,900,000

Using one aircraft delivering 1,000 kilograms of Sarin nerve gas or 100 kilograms of anthrax spores: Assumes the aircraft flies in a straight line over the target at optimal altitude and dispensing the agent as an aerosol. The study assumes that the biological agent would not make maximum use of this payload capability because this is inefficient. It is unclear this is realistic.

	Area Covered in Square Kilometers	Deaths Assuming 3,000-10,000 people Per Square Kilometer
Clear sunny day, light breeze		
Sarin Nerve Gas	0.74	300-700
Anthrax Spores	46	130,000-460,000
Overcast day or night, moderate wind		
Sarin Nerve Gas	0.8	400-800
Anthrax Spores	140	420,000-1,400,000
Clear calm night		
Sarin Nerve Gas	7.8	3,000-8,000
Anthrax Spores	300	1,000,000-3,000,000

Source: Adapted by the author from Office of Technology Assessment, Proliferation of Weapons of Mass Destruction: Assessing the Risks, U.S. Congress OTA-ISC-559, Washington, August, 1993, pp. 53-54.

Iranian Nuclear Weapons

Iran has long had a nuclear weapons program, but it has never been able to fund the kind of massive program Iraq established, and Iran has found it difficult much more difficult than Iraq to obtain nuclear technology. If Iraq's effort was a brute force program, that threw money at every obstacle and pursued multiple paths to proliferation, Iran's program has been more evolutionary and has often been delayed or down-scaled when technology and resources have proved unavailable.

Nuclear Weapons Efforts Under the Shah

When it first began, the Iranian nuclear weapons effort was more ambitious. In the early 1970s, the Shah acquired Iran's first nuclear reactor from the U.S. for the Amirabad Nuclear Research Center (now called the Amirabad Technical College) in Tehran. This five megawatt reactor was originally supplied by the U.S., and started up in 1967. It is regularly inspected by the IAEA, but it uses a core with 93% enriched uranium, which is suitable for some forms of nuclear weapon.[167]

The Shah established the Atomic Energy Organization of Iran in 1974, and rapidly began to negotiate for nuclear power plants. He concluded an extendible ten year nuclear fuel contract with the U.S. in 1974, with Germany in 1976, and France in 1977. In 1975, he purchased a 10% share in a Eurodif uranium enrichment plant being built at Tricastin in France that was part of a French, Belgian, Spanish, and Italian consortium. Under the agreement the Shah signed, Iran was to have full access to the enrichment technology Eurodif developed, and agreed to buy a quota of enriched uranium from the new plant.[168]

He also created an ambitious plan calling for a network of 23 power reactors throughout Iran that was to be operating by the mid-1990s, and sought to buy nuclear power plants from Germany and France. By the time the Shah fell in January, 1979, he had six reactors under contract, and was attempting to purchase a total of 12 nuclear power plants from Germany, France, and U.S. Two 1,300 megawatt German nuclear power plants at Bushehr were already 60% and 75% completed, and site preparation work had begun on the first of two 935 megawatt French plants at Darkhouin that were to be supplied by Framatome.[169] Thousands of Iranians were training in nuclear technology in France, the FRG, India, the U.K., and U.S.

Far less publicly, the Shah began a nuclear weapons research program, centered at the Amirabad Nuclear Research Center.[170] This research effort included studies of weapons designs and plutonium recovery from spent reactor fuel. It also involved a laser enrichment program which began in 1975, and led to a complex and highly illegal effort to obtain laser separation technology from the U.S. This latter effort, which does not seems to have had

any success, continued from 1976 until the Shah's fall, and four lasers operating in the critical 16 micron band were shipped to Iran in October, 1978.[171] At the same time, Iran worked on other ways to obtain plutonium, created a secret reprocessing research effort to use enriched uranium, and set up a small nuclear weapons design team.[172]

In 1976, Iran signed a secret contract to buy $700 million worth of yellow cake from South Africa, and appears to have reached an agreement to buy up to 1,000 metric tons a year.[173] It is unclear how much of this ore South Africa shipped before it agreed to adopt IAEA export restrictions in 1984, and whether South Africa really honored such export restrictions. Some sources indicate that South Africa still made major deliveries as late as 1988-1989.[174] Iran also tried to purchase 26.2 kilograms of highly enriched uranium; the application to the U.S. for this purchase was pending when the Shah fell.

Nuclear Weapons Efforts Under Khomeini

The new Khomeini government let much of the Shah's nuclear power program collapse during 1979 and 1980, although it kept the core of Iran's nuclear research effort alive. The Iran-Iraq War, however, soon led the Khomeini government to revive the nuclear weapons program. The government provided new funds to the research teams operating the U.S.-supplied reactor at the Amirabad Nuclear Research Center, although it continued to operate the reactor under IAEA safeguards. At least one senior official of the new government, the Ayatollah Mohammed Hussein Beheshti, stated to officials managing the nuclear research effort in 1981, that the mandate of Iran's nuclear program had become the development of a nuclear weapon. Khamenei implied the same thing in a speech to the Atomic Energy Organization in 1987, and some experts feel that the IRGC moved a great deal of the experts and equipment at the Amirabad Nuclear Research Center to a new nuclear weapons research facility near Isfahan in the mid-1980s. Unlike many Iranian facilities, the center at Isfahan was not declared to the IAEA until February 1992, when the IAEA was allowed to make a cursory inspection of six sites that various reports had claimed were the location of Iran's nuclear weapons efforts.[175]

Iran revitalized its laser isotope separation program in 1983, and held several conferences on the subject, including an international conference in September, 1987. It opened a new nuclear research center in Isfahan in 1984, located about four kilometers outside the city and between the villages of Shahrida and Fulashans. This facility was built at a scale far beyond the needs of peaceful research, and Iran sought French and Pakistani help for a new research reactor for this center. The Khomeini government may also have obtained several thousand pounds of uranium dioxide from Argentina by purchasing it through Algeria. Uranium dioxide is considerably more refined than yellow cake, and is much easier to use in irradiating material in a reactor to produce plutonium.[176]

While Iran proved unable to get a reactor from France or Pakistan, it had slightly more success with China. It obtained a subcritical research reactor from the People's Republic of China in 1985, and small Calutron to use in enrichment research in 1987. This Calutron was only a 1 milliamp machine, versus the 600 milliamp machines used by Iraq in its weapons enrichment efforts, and was so small that it was suitable only for research purposes -- specifically to test insulators and liners and to produce stable isotopes of zinc for pharmaceutical purposes.

Iran recruited Iranian nuclear scientists living overseas and tried to renew its power reactor program as a way of getting enriched material. In 1984, the Khomeini government began to restart work at the Bushehr reactor complex. The two 3,765 megawatt reactors were located on the Gulf about 18 kilometers southwest of the city. While most estimates indicate they were about 60% complete, others indicate that 85% of the construction work, and 65% of the electrical and mechanical work, were complete.[177]

These Iranian efforts suffered major set backs, however, when Iraq repeatedly bombed Iran's reactor projects at Bushehr. Iraqi bombings occurred on March 24, 1984, February 12, 1985, March 4, 1985, July 12, 1986, November 17, 1987, November 19, 1987, and July 19, 1988. At least some foreign technicians died during these bombings, and work on the reactors was often suspended. It is interesting to note, however, that the 1987 and 1988 raids may have been a response to the fact that Iran had begun to move IAEA safeguarded material to the area in February, 1987.[178]

Creeping Proliferation Under Rafsanjani

Since 1987, the course of the Iranian program has become harder to trace, and it has been the source of many unconfirmed rumors -- many inspired by the Iraqi-financed Iranian People's Mujahideen. U.S. experts do not believe that Iran's program comes close to being as advanced as Iraq's program was before the Gulf War. In fact, part of the reason that the Iranian program is difficult to analyze is that Iran its building its program up slowly. Creeping proliferation produces far fewer signs of activity than Iraq's massive investments.[179]

Those aspects of Iran's program that are visible indicate that Iran has had only uncertain success. Argentina agreed to train Iranian technicians at its Jose Balaseiro Nuclear Institute, and sold Iran $5.5 million worth of uranium for its small Amirabad Nuclear Research Center reactor in May, 1987. A CENA team visited Iran in late 1987 and early 1988, and seems to have agreed to sell Iran the technology necessary to operate its reactor with 20% enriched uranium as a substitute for the highly enriched core provided by the U.S., and possibly uranium enrichment and plutonium reprocessing technology as well.[180] Changes in Argentina's government then, however, made it much less willing to support proliferation. The Argentine government announced in February, 1992, that it was canceling

an $18 million nuclear technology sale to Iran because it had not signed a nuclear safeguards arrangement. Argentine press sources suggested, however, that Argentina was reacting to U.S. pressure.[181]

Iran has not found a source of new major reactors, although it has certainly tried. In February, 1990 a Spanish paper reported that Associated Enterprises of Spain was negotiating the completion of the two nuclear power plants at Bushehr. Another Spanish firm called ENUSA (National uranium Enterprises) was to provide the fuel, and Kraftwerk Union (KWU) would be involved. Later reports indicated that a 10 man delegation from Iran's Ministry of Industry was in Madrid negotiating with the Director of Associated Enterprises, Adolofo Garcia Rodriguez.[182]

These reports were followed in March, 1990 by reports that the former Soviet Union had provided an initial agreement to work on two 440 megawatt nuclear power plants in Iran, and that this might include both a new power plant and completion of the two PMRs unit at Bushehr. Later reports claimed a contract was signed in September, 1992, and that the reactors would be RBMK types similar to the pressurized water reactor used at Chernobyl. Such reports have been contradictory. Some experts state Russia quietly deferred the project after discussions with the U.S.[183] Other reports indicate that Iran approached South Korea to explore the possibility it would rebuild the facilities at Bushehr in September, 1992, and that the Korea Power Engineering Company (KOPEC) sent a survey team to Iran to look at the project.[184]

Iran also sought nuclear reactors from India. In early 1991, reports surfaced that Iran and India were negotiating the sale of a 10 megawatt research reactor. While such a reactor is comparatively small, some analysts argue that it can produce enough plutonium or enriched uranium to produce the fissile material for about one bomb a year if it is run 24 hours a day. It is interesting that India seems to have offered Iran a 5 megawatt reactor for research purposes, but Iran pressed for a larger 10 megawatt reactor. These same reports indicated that Iran was seeking a 220 megawatt power reactor. According to some sources, India was finally persuaded to sell Iran the 10 megawatt reactor, and even signed an agreement on November 11, 1991, but delayed or halted the deal after intervention by the U.S.[185]

There is little doubt that Iran wants nuclear reactors for nuclear weapons purposes since it does not need a large reactor for research purposes. Iran's present electric power output is subsidized at so low a rate that it costs less than one-tenth of the price it would take to pay for power from a nuclear reactor. With the exception of the area along its coast on the Persian Gulf, Iran also rarely uses 50% of its present total generating capacity -- although much of that capacity is not available due to poor maintenance.[186] Because Iran has

no conceivable chance of recovering a major investment in nuclear power through any saving in domestic oil and gas consumption, Iranian arguments of this kind are economically absurd.

In any case, none of the reports of new Iranian reactor programs have yet been followed by major construction activity. Iran's only significant reactor remains the small 5 megawatt research reactor that the U.S.-supplied in 1967. As a result, Iran may not have a major reactor on-line before the year 2000.[187]

Iran's Search for Nuclear Technology

Iran has, however, engaged in other activities which may eventually give it the fissile material it needs. While Iran has never been able to use the Shah's 10% investment in Eurodif to obtain enriched material, there are significant uranium deposits (at least 5,000 tons) in the Shagand region of Iran's Yazd Province.[188] Iran may have a uranium processing or enrichment facility at Pilcaniyeu. Iran announced in 1987 that it had plans to set up a yellow cake plant in Yazd Province, and this facility was under construction by 1989.[189] It may have opened a new uranium ore processing plant close to its Shagand uranium mine in March, 1990, and it seems to have extended its search for uranium ore into three additional areas.[190]

Iran has found new sources of nuclear technology. On February 7, 1990, the speaker of the Majlis publicly toured the Iranian Atomic Energy Organization and opened a new Jabir Ibn al Hayyan laboratory to train Iranian nuclear technicians.[191] Reports surfaced later that Iran had at least 200 scientists and a work force of about 2,000 working on nuclear research.

Pakistan signed a nuclear cooperation agreement with Iran in 1987. Specialists from Iran's Atomic Energy Organization began to train in Pakistan, and Dr. Abdul Kadr Khan, who has directed much of Pakistan's effort to develop nuclear weapons material, visited Tehran and Bushehr in February, 1986 and January, 1987. Some reports indicate that Pakistan provided aid in developing plutonium extraction and other weapons technologies.[192] Pakistan denied, however, that it was giving Iran assistance in creating a nuclear center at Kazmin in November, 1990. It also indicated in 1992 that it had denied an Iranian request to provide nuclear weapons technology. U.S. experts indicated that this denial was probably correct.[193]

Iran has strengthened its nuclear research ties to the People's Republic of China, although their military significance is difficult to put into perspective. The two countries signed a broad nuclear research cooperation agreement in 1990. On January 21, 1991, Ali Akbar Torkan, then Iran's Minister of Defense and Armed Forces Logistics, signed an agreement with General Jiang Xua, the Deputy Director of China's Commission on Science,

Technology, and Industry for National Defense to build a small 27-kilowatt research reactor at Iran's nuclear weapons research facility at Isfahan. This reactor is to be built by the China Nuclear Energy Industry Corporation, and some sources indicate construction was underway by September, 1991.[194]

In March 1992, Rafsanjani was reported to have signed a contract to buy one or two 300-330 megawatt reactors from the People's Republic of China during a visit to Beijing. The sale of one reactor was announced by Iran's Minister of Defense during the visit, and led to immediate U.S. queries to the People's Republic of China. As a result, the sale was deferred, but there are reports that substantial numbers of Chinese nuclear technicians are working in Iran and the sale may still go through.[195]

The Debate Over the Size of Iran's Effort

The People's Mujahideen, an anti-regime group, has claimed that Iran has succeeded in building a far more important mix of major nuclear weapons facilities. It has reported that these facilities include a weapons site called Ma'allem Kelayah, near Qazvin on the Caspian. This facility is said to be an IRGC-run facility established in 1987, which has involved an Iranian investment of $300 million. This site was supposed to house the 10 megawatt reactor Iran tried to buy from India.

The People's Mujahideen has claimed that the two Soviet reactors discussed earlier are to be installed at a large site at Gorgan on the Caspian, under the direction of Russian physicists. It has claimed that the People's Republic of China has provided uranium enrichment equipment and technicians for the site at Darkhouin, where Iran once planned to build a French reactor; that a nuclear reactor was being constructed at Karaj; and that another nuclear weapons facility exists in the south central part of Iran near the Iraqi border. It claimed that the ammonia and urea plant that the British firm of M.W. Kellog was building at Borujerd, in Khorassan province near the border with Turkistan, might be adapted to produce heavy water.

In addition, the People's Mujahideen claimed that Amir Kabar Technical University, the Atomic Energy Organization of Iran, Dor Argham Ltd., the Education and Research Institute, GAM Iranian Communications, Ghoods Research Center, Iran Argham Co., Iran Electronic Industries, Iranian Research Organization, Ministry of Sepah, Research and Development Group, Sezemane Sanaye Defa, the Sharif University of Technology, Taradis Iran Computer Company, and Zakaria Al-Razi Chemical Company are all participants in the Iranian nuclear weapons effort. [196]

There is little direct evidence to confirm the People's Mujahideen claims. The IAEA conducted a limited inspection of six of these sites in February, 1992. It found no sign of weapons activity at any of these sites. It found that the uranium mining site at Saghand

which the IAEA was at least five years away from production and had no uranium concentration plant. It found the facility at Ma'allem Kelayah, which was said to be a nuclear weapons research center, to be little more than a motel-sized training and conference center. It found the People's Republic of China-supplied Calutron at Shiraz was so small it could only be used to produce isotopes for medical research.

Some sources have charged that the IAEA had only conducted a "familiarization tour", and that the IAEA may have been led to a decoy site when it thought it was investigating a facility called Ma'allem Kelayah. Nevertheless, the IAEA did not find any of the rumored facilities. The reports that the IAEA was led to the wrong site have been vehemently denied by David Kidd, a spokesman for the IAEA.[197]

While radioactive material has been sold on the black market by CIS and Central European citizens, to date it has either been plutonium 240, low grade enriched uranium, or isotopes of other material which has no value in a nuclear weapons program. Reports during 1992 and 1993 that Iran has hired large numbers of Soviet scientists, bought weapons grade material from the former Soviet Union, or even bought nuclear armed missiles from Khazakhstan have all proved exaggerated or incorrect. There also has been no indication that Iran has bought nuclear warheads from Khazakhstan. There is reason to fear some transfer of nuclear weapon technology, and that some nuclear physicists and engineers may have entered Iran from the former Soviet Union. To date, however, all of the so-called cases of such technology transfer have not been confirmed. [198]

It is also important to note that many Iranian officials have denied that Iran is building nuclear weapons. For example, President Khamenei said on July 13, 1992, that such charges were the result of "American and Zionist loudspeakers...obviously false....They know it is a lie....You are mistaken if you think that the Islamic Republic's strength lies in the obtaining or domestic manufacture of an atomic bomb....the power of faith will foil all the conspiracies and ploys of the enemy.." Reza Amrollahi, the head of Iran's Organization for Atomic Energy has said that, "Our nuclear program is peaceful...My country has signed the NPT and has repeatedly expressed its willingness to honor it...Also, we are an active member of the IAEA."[199]

Iran also let a new team from the IAEA visit Iran in November, 1993. This team had been given detailed briefings by the U.S. and other Western countries, and was allowed to visit suspected buildings at three main nuclear research complexes near Tehran, Isfahan, and Karaj. Like the previous IAEA mission, it was political in character, not a full inspection mission, and was not equipped or organized to find covert Iranian activities or examine all of the activities in the research facilities it was allowed to visit. It is also not clear whether it was given adequate access to soil and particle samples in the facilities it was allowed to

visit. Nevertheless, it seems unlikely that Iran would have permitted such an IAEA visit if it had a major nuclear enrichment effort underway in any of its known facilities.[200]

Future Trends in Iran's Nuclear Weapons Effort

Nevertheless, it seems clear that Iran is continuing to allocate significant resources to its nuclear weapons efforts, as well as to efforts to improve its chemical weapons and develop biological weapons. Robert Gates, then Director of Central Intelligence, testified to Congress in February, 1992, that Iran was, "Building up its special weapons capability as part of a massive...effort to develop its military and defense capability."[201] While U.S. experts question whether Iran can have a nuclear weapon before the end of the 1990s, few doubt that Iran's current level of effort can give it a nuclear weapon within the next 10-15 years. Press reports on the U.S. Central Intelligence Agency (CIA)'s National Intelligence Estimate (NIE) on this subject for 1992 indicate that the CIA estimated Iran could have a nuclear weapon by the year 2000.[202]

It is also impossible to dismiss the possibility that Iran or Iraq would chose to develop and use a "radiological weapon". Such a weapon could take three forms.

- *The first would be a "dirty weapon"* using fissile material with contaminated or low enrichment levels that would have limit heat and blast effects, but still produce yields of 3 to 5 kilotons, and which would effectively poison a city if detonated near the ground. Such a device would reduce some of the manufacturing and design problems inherent in creating clean or efficient nuclear weapons.
- *The second would be to use a weapon that had not been tested, which was felt to be unreliable, or which was on an inaccurate missile* and detonate it near the ground so that radiation effects compensate for a failure to reach design efficiency or accuracy of the delivery system.
- *The third would be to use radioactive material in micro-powder or liquid form as a terror or unconventional weapon*. It would be very difficult to get substantial lethality from the use of radioactive material, and such a weapon would be less efficient than biological weapons in terms of weight and lethality. It would, however, have the capacity to contaminate a key area and to create panic.

While the U.S. and Russia have rejected such weapons because they have the ability to precisely control the yield from their nuclear weapons, such options might be attractive to Iran or Iraq. As is the case with chemical and biological weapons, even the prospect of Iran's acquiring any such nuclear weapons has increased its ability to intimidate its neighbors.

As for war fighting capability, the actual yield and effects of any Iranian nuclear weapon are probably not key issues. Any working nuclear device Iran is likely to develop

will be sufficient to destroy any hardened target, area target, or city in the Middle East. Nuclear weapons do, however, differ sharply in their effect as they grow in size. It is not possible to quantify these effects in terms of fallout, and the data on prompt radiation are controversial in terms of their lethal effect. Table IX-5 does, however, illustrate how the different yields of the kind of fission and boosted fission weapons that Iran and Iraq might develop vary in effect.

Table IX-5

The Thermal and Blast Effects of Nuclear Weapons
Radius of Effect in Kilometers

Yield in Kilotons	Metals Vaporize	Metals Melt	Wood Burns	3rd Degree Burns	5 psi/ 160 mph Winds	3 psi 116 mph Winds
10	0.337	0.675	1.3	1.9	1.3	1.6
20	0.477	0.954	1.9	2.7	2.0	2.5
50	0.754	1.6	3.0	4.3	2.7	3.3
100	1.0	2.0	4.3	5.7	3.5	4.3
200		1.5	2.8	5.7	8.0	4.5 5.4

Source: Adapted by the author from the Royal United Services Institute, Nuclear Attack: Civil Defense, London, RUSI/Brassey's, 1982, pp. 30-36.

By the time Iran has significant nuclear capability, it also should have significant missile, cruise missile, and long-range strike aircraft capability. It should have rebuilt much of its conventional capabilities to the point where it has significant war fighting capabilities, and it will pose a major threat to other nations in the region -- possibly as far away as Israel.

As is the case with most of the Third World, Iran's neighbors are extremely vulnerable to attacks on a few cities. Even one successful nuclear attack might force a fundamental restructuring of their politics and/or economy. Given the most critical target, they are effectively "one bomb" countries. Such Iranian capabilities raise major mid-term and

long-term challenges in terms of deterrence, defense, retaliation, and arms control. Missile defense, while possible, seems unlikely to be either leak proof, or the kind of "confidence builder" that will lead other powers to avoid preemption and attacks on Iranian facilities, or reduce reliance on retaliation. In practice, this raises the specter of either effective arms control based on full and reliable inspection, or the need for the U.S. to retain a superior capability for theater nuclear retaliation.

The Warfighting Impact of Iran's Weapons of Mass Destruction[203]

Iran's ability to use weapons of mass destruction is currently in transition. Iran clearly has the ability to use aircraft and artillery to deliver large volumes of chemical bombs and ordnance. It probably has nerve weapons and at least crude chemically armed missile warheads. It may have biological bombs and warheads, and can almost certainly produce some amount of biological agents. It is doubtful that Iran as yet has highly lethal storable biological agents, but this is possible. Iran seems to be at least half a decade away from a nuclear weapon and may be as much as a decade away from the ability to produce a few very large nuclear devices.

Much will depend on the rate of outside technology transfer. Iran is probably only a few years away from deploying moderately lethal and accurate chemical and biological missile warheads on missiles with ranges of 600-1,000 kilometers. It can already attack targets in the southern Gulf and at ranges of 1,000-1,500 kilometers with long-range strike aircraft.

Iran's chemical weapons capability already enhances its ability to intimidate and attack its neighbors. The advantages chemical weapons give Iran should not, however, be exaggerated. Iraq may still be able to retaliate in kind with weapons it has hidden from the U.N., and will begin to rebuild its chemical warfare capabilities the moment U.N. inspection ceases. The southern Gulf states have already lived through the threat of Iraqi missile attacks using chemical weapons, and Israel is still outside Iran's effective range and will retain far superior retaliatory capabilities. As long as the West maintains a strong military presence in the region, the southern Gulf states may be willing to shift towards the Iranian or Iraqi position because of their fear of chemical weapons, but they are unlikely to sacrifice serious national interests for this purpose.

Similarly, the southern Gulf states are likely to continue to resist Iran if a crisis escalated to actual war fighting with chemical weapons as long as the U.S. and the West take immediate steps to strengthen their active and passive defenses, and show that they will decisively retaliate. The southern Gulf states will, however, be keenly conscious of their

vulnerabilities. They will insist on early and immediate Western action. The West must understand that few southern Gulf states will resist Iran if the West attempts to negotiate, or respond in terms of proportionate escalation, if Iran should actually initiate any kind of chemical attack. The price of southern Gulf military and political support -- at least from threatened countries -- will be Western action that decisively demonstrates to Iran that the cost of using such weapons is far higher than they are worth.

The present regime in Iran seems less likely to take major risks in using weapons of mass destruction than Iraq, and seems particularly unlikely to take such risks if this means damage to Iranian civilians or to the Iranian economy. Nevertheless, it is impossible to dismiss the possibility of a crisis or conflict where Iranian leaders would react by trying to use chemical weapons or other weapons of mass destruction as a counterbalance to the West's superiority in conventional weapons. It is almost certain that Iran would use chemical weapons against Iraq if a major Iraqi invasion escalated beyond border conflicts and incidents.

As for biological warfare, Iran may well be experimenting with remotely piloted vehicles and cruise missile designs that would eventually serve as more efficient delivery systems. It can almost certainly produce a significant amount of biological agents with only a limited risk of outside detection, with little risk that anyone will be able to predict the precise biological agent or toxin Iran would use, or its lethality and cycle of infection. It probably already has the ability to deploy biological bombs and may soon have at least a limited ability to deploy biological warheads.

It is doubtful that Iran has highly lethal storable biological agents, can exploit the potential of biological warfare to achieve lethalities far greater that those of chemical weapons, or can approach the lethality of nuclear weapons. Iran may, however, be able to initiate the use of less lethal biological warfare in unconventional attacks against its neighbors, the West, or even Western states.

Iran has a wide range of possible ways to escalate. Iran might conduct a visible demonstration of a biological warfare test to aid in political intimidation or blackmail. It might escalate to the use of biological weapons in an effort to put military pressure on a neighbor to limit Western intervention. It might seek to use large-scale biological attacks to halt a Western counter-attack or to try to erode the political support for Western intervention, and it is at least possible that it might covertly deploy and use biological agents in Europe or the U.S.

Biological warfare lends itself to indirect, unattributable, or delayed attacks. Under some circumstances, Iran might be able to conduct an attack where it could at least preserve plausible deniability, or blame the attack on third parties like Iraq or a terrorist movement.

Delayed or low lethality attacks would present serious problems for the West deciding on the proper form of retaliation. Depending on the context of the crisis or conflict, world opinion might or might not support the scale of retaliation necessary to deter or defeat Iran.

Iran might use biological agents to attempt to contaminate a key oil or water facility, or even as a barrier defense. Agents like anthrax, for example, are capable of long term contamination and even if they have low to moderate lethality, decontamination could be time consuming, require troops to wear protection gear, and present major psychological problems in terms of the willingness of civilian to return to any facility that had been attacked -- decontaminated or not.

There are no rules that prevent Iran from using mixes of chemical and biological weapons, or "cocktails" that mix the use of different chemical and/or biological agents at the same time. Iran has already suffered from Iraq's use of mixes of mustard gas and nerve gas in its attacks on Iranian troops in 1987 and 1988. While Iran may be more pragmatic than Iraq, little of the rhetoric of Iranian leaders indicates that Iran is any more likely than Iraq to see major political and military barriers to combining different types of weapons of mass destruction. While they may be more realistic in estimating the political costs and risk of military retaliation, and more sensitive to any damage to enemy populations, expediency is likely to triumph.

It also is impossible to dismiss the mid-term risk Iran could use such weapons to do catastrophic or critical damage to a neighboring state, or Western military forces. Much will depend on the attacked nation's capability for prevention, early detection, and medical treatment. Once again, all of Iran's neighbors are "one bomb states" in the sense they would be highly vulnerable to the political and economic impact of even one successful major attack on their capital or a large population center.

These risks will grow in direct proportion to Iran's ability to develop and weaponize highly lethal biological agents that can be delivered by strike aircraft or long-range missiles, or which are so lethal that covert use could provide high death rates even in city sized areas. One key problem in biological warfare is that potential lethality is so great relative to the probable state of the art in Iraq, and the technology to increase lethality is becoming so readily available, that it is virtually impossible to characterize future threats.

The West's past efforts to deny Iraq nuclear capability have probably already channeled Iraqi research and development efforts into a more serious effort to create biological weapons that can act as a substitute for nuclear weapons. While there is no way to predict when such efforts will be successful, Iran should have biological agents with lethalities approaching those of very small nuclear weapons at some point in the next four to eight years. It is probably too late for controls on dual-use technology to prevent this,

although such controls may delay the date and significantly limit the size of the threat Iran can deploy.

Nuclear weapons seem to be a less imminent risk. Iran will probably need 8 to 10 years to acquire nuclear weapons. Once it acquires such weapons, however, a nuclear-armed Iran may see its possession of nuclear weapons as an equalizer for its conventional inferiority. It will try to exploit the vulnerability and fears of its neighbors, and of the U.S. and any other Western country that would deploy military forces into the region. Crossing the nuclear threshold, will also allow Iran to pose a kind of threat is likely to be perceived as fundamentally different in character by its potential enemies, and to raise the stakes to the point where at least some states may no longer be willing to take the risk of denying Iran political or military success.

Much will depend on the precise character of the Iranian regime as it evolves over time. A shift to truly radical religious leadership could lead to far greater willingness to take risks or to use weapons of mass destruction for ideological reasons. It is equally possible, however, that time will make Iran's regime even more pragmatic. Iran is very vulnerable to retaliation. Its weak economy and dependence on agricultural imports make it more vulnerable to strategic bombing than Iraq. Iran's leaders have suffered through a decade of war, and are likely to understand these vulnerabilities and take them seriously.

What Iran does have in common with Iraq is that its present and potential capabilities to use weapons of mass destruction are already having a significant impact on the region and the southern Gulf. They offer Iran at least partial compensation for the weaknesses of its conventional forces, and they already confront the U.S. and other Western power projection forces with the risk of a limited chemical and biological attack. They also raise the practical war fighting problem that the West cannot hope to quickly preempt or destroy such Iranian delivery capabilities and that the present effort to limit the flow of equipment and technology can only inhibit and delay the development of Iran's capabilities.

As a result, the West must be able to demonstrate to the southern Gulf states (and itself) that it has a capability for massive conventional retaliation and retains the option of striking against Iran and Iraq with its own weapons of mass destruction. Strengthening the missile and aircraft defense capabilities of the region and Western power projection capabilities, and improving detection, defense gear, and antidotes will help. The ultimate test of deterrence, however, is likely to be the threat of massive offensive power.

IX. Dealing With Iran

Iran's ideology and politics remain hostile to the West, friendly Arab states, and secular Islamic regimes. While some of Iran's actions and rhetoric have moderated since the death of Khomeini, some of its actions and rhetoric have not. Iran has encouraged Shi'ite extremist groups to launch attacks against the South Lebanon Army in southern Lebanon, and to attempt to penetrate into Israel. Iran has become a pillar of the hard-line rejectionist effort that denies Israel's right to exist. Iran has strongly supported Islamic extremists in the civil war in the Sudan, Algeria, and Egypt. It has opposed Israel's peace agreement with the PLO, and supported military action by the Hizbollah in Southern Lebanon.

At least in the near-term, there are few prospects for close relations with Iran, or even correct relations. Neither the West or southern Gulf states have any reason to build-up Iran's forces as a counterbalance to Iraq. Regardless of the Arab proverb, the enemy of our enemy is rarely a friend.

At the same time, Iran's military build-up should not be described as clearly aggressive or linked to an unalterable search for regional hegemony. Iran can scarcely be expected to accept the force levels it had at the end of the Iran-Iraq War. Its active tank forces had been cut from 1,735 to 600, it had lost nearly 1,000 other armored vehicles during the last six months of the war, and nearly half of its artillery. It only had 160 aircraft, and many were not operational. Iran has many reasons for strengthening its military forces -- other than a desire to attack or intimidate its neighbors. It still faces a major threat from Iraq. Iraq still deploys a large part of its forces along the Iranian border, and the cease-fire in the Iran-Iraq War has several major unresolved issues -- including war reparation damages and prisoners of war.[204]

Similarly, Iran's support of Islamic extremism must be weighed against the fact it has made several peace making attempts in Armenia and Azerbaijan. While it has seized full control of islands in the Gulf, it has also improved some aspects of its relations with the southern Gulf states and its economic ties with Western Europe. It imported some $527 million worth of goods from the U.S. in 1991, a nine fold increase over 1989. It did so although the U.S. continued to list Iran as a terrorist nation, and most of the candidates in Iran's 1992 elections continued to denounce the U.S.[205]

The West and southern Gulf should expect Iranian pragmatism and not Iranian moderation. *If* the West maintains strong power projection forces, *if* the southern Gulf builds up its military capabilities and cooperation with the West, and *if* every effort is made to limit the more threatening aspects of Iran's military build-up, Iran is likely to take "moderate" action because it has no choice.

There is every reason to discourage arms transfers to Iran, particularly modern armor, long-range attack aircraft, advanced anti-ship and surface-to-surface missiles, submarines, and amphibious ships. There is no such thing as "dual-use" technology transfer to Iran. Regardless of any safeguards short of constant inspection, all dual-use technology will be put to military use whenever this is to Iran's advantage, and virtually every item of nuclear, chemical, biological, and aerospace technology Iran can use in advancing its acquisition of weapons of mass destruction will be put to that use.

The West and the southern Gulf should not extend "containment" from military activities to attempts to isolated Iran in political, culture, or economic terms. Iran's threatening actions should be treated as threats, but the West and the southern Gulf should encourage stronger economic ties to Iran, and encourage any Iranian political initiatives that can be accepted as moderate or as serving mutual interests.

At the same time, the West and the southern Gulf must recognize that improved economic ties, arms control, and controls on technology transfer are not a substitute for power projection and war fighting capabilities. Such measures cannot prevent Iran from building up its conventional forces, or improving its capabilities to use weapons of mass destruction. Iran already has chemical weapons and will probably succeed in weaponizing highly lethal biological weapons. It may succeed in acquiring a nuclear device. The West and southern Gulf should do what they can to keep Iran pragmatic, and encourage the development of a moderate Iran. But, they must also be ready to use conventional military force, improve their defenses against weapons of mass destruction, and develop their capabilities to preempt and retaliate.

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[1]The military manpower, force strength, and equipment estimates in this section are made by the author using a wide range of sources, including computerized data bases, interviews, and press clipping services. Some are impossible to reference in ways of use to the reader. The force strength statistics are generally adapted from informal estimates by U.S., Israeli, and British experts and from the figures in various editions of the International Institute for Strategic Studies Military Balance and Jaffee Center for Strategic Studies, The Military Balance in the Middle East (JCSS, Tel Aviv). Material has also been drawn from computer print outs from NEXIS, the United States Naval Institute data base, and from the DMS/FI Market Intelligence Reports data base. Other sources include the Military Technology "World Defense Almanac for 1991-1992," published in early 1992; Foreign Affairs Division, "Middle East Arms Control and Related Issues," Washington, Congressional Research Service, 91-384F, May 1, 1991; Middle East Economic Digest, "MEED Special Report: Defense," Volume 35, December 13, 1991, Peter Lewis Young, "American Perceptions of Iran," Asian Defense, February, 1993, pp. 25-28; Dr. Anoushiravan Ehteshami, "The Armed Forces of the Islamic Republic of Iran", Jane's Intelligence Review, February, 1993, pp. 76-79; Gordon Jacobs and Tim McCarthy, "China Missile Sales -- Few Changes for the Future," Jane's Intelligence Review, December, 1992, pp. 559-563; Alan George, "Tehran Asserts its Independence", The Middle East, April 1993, pp. 36-37; Calude van England, "Iran on Military Renewal," Christian Science Monitor, March 4, 1993, p. 7; Shireen T. Hunter, "Iran: Renewed Threat in the Persian Gulf?", The World & I, April, 1993, pp. 80-87; James Wyllie, "Iran - Quest for Security and Influence," Jane's Intelligence Review, July 1993, pp. 311-312; and material in Patrick Clawson, Iran's Challenge to the West, How, When, and Why, Washington, The Washington Institute Policy Papers, Number Thirty Three, 1993.

Weapons data are taken from many sources, including computerized material available in NEXIS, and various editions of Jane's Fighting Ships (Jane's Publishing); Jane's Naval Weapons Systems (Jane's Publishing); Jane's Armor and Artillery (Jane's Publishing); Jane's Infantry Weapons (Jane's Publishing); Jane's Military Vehicles and Logistics (Jane's Publishing); Jane's Land-Base Air Defense (Jane's Publishing); Jane's All the World's Aircraft (Jane's Publishing); Jane's Battlefield Surveillance Systems, (Jane's Publishing); Jane's Radar and Electronic Warfare Systems (Jane's Publishing), Jane's C^3I Systems (Jane's Publishing); Jane's Air-Launched Weapons Systems (Jane's Publishing); Jane's Defense Appointments & Procurement Handbook (Middle East Edition) (Jane's Publishing); Tanks of the World (Bernard and Grafe); Weyer's Warships (Bernard and Grafe); and Warplanes of the World (Bernard and Grafe).

Other military background, effectiveness, strength, organizational, and history data are taken from Anthony H. Cordesman, The Gulf and the Search for Strategic Stability, Boulder, Westview, 1984, The Gulf and the West, Boulder, Westview, 1988, and Weapons of Mass Destruction in the Middle East, London, Brassey's/RUSI, 1991; Anthony H. Cordesman and Abraham Wagner, The Lessons of Modern War, Volume II, Boulder, Westview, 1989; Department of Defense, Conduct of the Persian Gulf War: Final Report, Department of Defense, April, 1992, pp. 10-12; the relevant country or war sections of Herbert K. Tillema, International Conflict Since 1945, Boulder, Westview, 1991; Department of Defense and Department of State, Congressional Presentation for Security Assistance Programs, Fiscal Year 1993, Washington, Department of State, 1992; various annual editions of John Laffin's The World in Conflict or War Annual, London, Brassey's, and John Keegan, World Armies, London, Macmillan, 1983.

[2] Many of these borders are in dispute, particularly the boundaries with Afghanistan and Pakistan. Iran seemed closed to an agreement with Iraq in the spring of 1991, but the agreement with Iraq was not committed to writing before the invasion of Kuwait led to a break down of negotiations. Iran also occupies three islands claimed by the UAE: Jazireh-ye Tonb-e Bozorg, Jazireh-ye Tonb-e Kucheck, and Jazireh-ye Abu Musa.

[3] CIA, World Factbook, 1991, pp. 146-147.

[4] For an excellent analysis of the manipulation of the election of the Majlis see David Menashri, "The Domestic Power Struggle in the Fourth Iranian Majlis Elections," Orient, Vol. 33, No. 3. 1992, pp. 387-408. For related reporting on the role of senior leaders see New York Times, March 24, 1992, p. A-8, May 10, 1992, p. A-15; Washington Post, April 14, 1992, p. A-16, April 18, 1992, pp. A-14 & A-20; Washington Times, April 15, 1992, p. A-1, May 18, 1992, p. E-4; Wall Street Journal, April 16, 1992, p. A-18; Dr. Anoushiravan Ehteshami, "The Armed Forces of the Islamic Republic of Iran", Jane's Intelligence Review, February, 1993, pp. 76-79; U.S. News and World Report, November 23, 1993, pp. 51-53; Washington Post, February 12, 1993, p. A-29; The Middle East, March, 1993, pp. 13-15.

[5] For useful general background on Iran's economic efforts see Jahangir Amuzger, "The Iranian Economy Before and After the Revolution," Middle East Journal, Volume 46, No. 3, Summer 1992, pp. 413-425; Christian Science Monitor, August 12, 1993, p. 9; Magda Abu Fadil, "Underground Profits," The Middle East, September, 1993, p. 29. The Middle East, June, 1993, pp. 27-29; Middle East Economic Digest, Vol. 37. pp. 2-3; Chris Kutschera, "Falling into a financial quagmire, The Middle East, January 1993, pp. 18-19; Washington Times, May 17, 1993, p. A-3; Los Angeles Times, September 29, 1992.

[6] Wall Street Journal, June 7, 1993, p. 10.

[7] New York Times, November 7, 1992, p. A-1.

[8] New York Times, January 31, 1993, p. A-8.

[9] Some experts question whether Iran's current fields can produce at over 3.5 million barrels a day without overproducing the fields. Iran has some 70 oil and gas fields.

[10] Much of this discussion of Iran's current politics and economics is based on discussions, working papers, and interviews during the American Academy for the Advancement of Science's conference on developments in the Middle East, held in Barcelona during October 27-November 1, 1993. Also see Wall Street Journal, November 25, 1992, p. A-1, and Paul Stevens, Oil and Politics: The Post-War Gulf, London, Royal Institute of International Affairs, 1992; Christian Science Monitor, June 22, 1993, p. 18.

[11] Christian Science Monitor, June 22, 1993, p. 18.

[12] Assad Houayoun, "Assessing the Islamic Republic", Global Affairs, vol. 8, Spring 1993, pp. 71-82.

[13] Washington Times, August 31, 1993, pp. A-7; New York Times, May 28, 1993, p. A-8, June 11, 1993, p. A-3, June 14, 1993, p. A-8 August 30, 1993, p. A-3; Christian Science Monitor, June 11, 1993, p. 8;

Washington Post, June 14, 1993, p. A-30; Defense and Foreign Affairs, June 1993, p. 20.
[14] New York Times, August 17, 1993, p. A-8; Washington Times, August 11, 1993, p. A-7.
[15] Jane's Defense Weekly, June 30, 1990, pp. 1301-1302
[16] Washington Post, August 20, 1989, p. A-1.
[17] Much of this analysis is based on work by Kenneth Katzman in The Warriors of Islam: Iran's Revolutionary Guard, Boulder, Westview, 1993.
[18] There purges continued in March and April of 1989, Washington Times, April 20, 1989, p. A-2.
[19] Teheran domestic radio, English service, September 12, 1988.
[20] New York Times, September 3, 1989, p. A-4; Washington Post, September 3, 1989, p. A-25.
[21] Iran domestic radio service, May 11, 1986, November 15, 1987, and March 2, 1988.
[22] Jane's Defense Weekly, June 30, 1990, pp. 1301-1302; March 18, 1989, p. 428; Baltimore Sun, February 28, 1989, p. 2A; Washington Times, March 23, 1989, p. A-7, April 20, 1989, p. A-2.
[23]
[24] Afshar was Deputy Chief of Staff at the armed forces headquarters when Rafsanjani had command over the military.
[25] FBIS, July 25, 1990, pp. 60-62.
[26] Jane's Defense Weekly, June 30, 1990, pp. 1301-1302; March 18, 1989, p. 428; Baltimore Sun, February 28, 1989, p. 2A; Washington Times, March 23, 1989, p. A-7, April 20, 1989, p. A-2, Jane's Intelligence Monthly, July, 1993, pp. 311-312.
[27] Jane's Defense Weekly, March 18, 1989, p. 428; Baltimore Sun, February 28, 1989, p. 2A; Washington Times, March 23, 1989, p. A-7, May 26, 1992, p. A-2, June 9, 1992, p. A-2, June 16, 1992, p. A-2, July 8, 1992, p. A-7; The Estimate, October 13-16, 1989, p. 1; Washington Post, April 28, 1992, p. A-1, July 16, 1992, p. A-18; Wall Street Journal, May 5, 1992, p. A-1.
[28] The two countries met at the Deputy Foreign Minister level. Mohammed Javad Zarif came from Iran and Saad Abdelmedguid al-Faisal came from the Iraq. New York Times, October 21, 1993, p. A-3 Washington Times, October 22, 1993, p. A-18, July 1, 1993, p. A-18.
[29] Washington Post, July 1, 1993, p. A-18.
[30] Jane's Defense Weekly, September 4, 1993, p. 27.
[31] U.S. State Department, Terrorist Group Profiles, Washington, GPO, 1991; U.S. State Department, Patterns of Global Terrorism, Washington, GPO, 1993, p. 22; Washington Post, November 21, 1993, p. A-1 and A-35.
[32] Minneapolis Star Tribune, August 14, 1993, p. B-1; Washington Post, March 17, 1993, p. A-26, May 14, 1993, p. 31, May 16, 1993, p. A-21; New York Times, April 11, 1993, p. A-28, April 18, 1993, p. A-8, July 28, 1993, p. A-6, March 18, 1993, p. A-8; August 22, 1993, p. D-1; Washington Times, March 17, 1993, p. A-7, Time, May 31, 1993, pp. 46-51; U.S. State Department, Terrorist Group Profiles, Washington, GPO, 1991; U.S. State Department, Patterns of Global Terrorism, Washington, GPO, 1993, p. 22; Washington Post, November 21, 1993, p. A-1 and A-35.
[33] Washington Post, ; New York Times, May 26, 1993, p. A-8, June 24, 1992, p. A-3, July 17, 1993, p. A-14, Agence France Presse, April 12, 1993, May 15, 1993, July 19, 1993, BBC ME/1664/A, April 16, 1993, ME/1721/A, June 22, 1993 ; Armed Forces Journal, July, 1992, p. 23; Christian Science Monitor, ; Financial Times, May 26, 12993, p. 6 ; Washington Times, April 12, 1993, p. A-2, Baltimore Sun, May 24 ,1993, p. 5-A.
[34] The Strait of Hormuz is about 180 kilometer long (112 miles) and 39 kilometer (24 miles) wide at it is narrowest point. Its minimum depth is 45 meters (148 feet).
[35] Washington Post, April 17, 1992, p. A-18, September 25, 1992, p. 31, September 29, 1992, p. A-15; New York Times, April 16, 1992, September 13, p. A-22, September 17, 1992, p. A-12, October 4, 1992, p. A-11; Armed Forces Journal, July, 1992, p. 23; Christian Science Monitor, September 18, 1992, p. 6; Financial Times, October 13, 1992, p. 5; Washington Times, September 28, 1992, p. A-2, December 27, 1992, p. A-14; Defense and Foreign Affairs, October-November, 1992, p. 6.
[36] For further details, see "Patterns of Global Terrorism, 1992,", Washington, U.S. Department of State, April 1993, pp. 21-22; Yedidya Atlas, "Iran, An Islamic Threat," Midstream, October, 1992, pp. 2-7; Anoushiravan Ehteshami, "The Armed Forces of the Islamic Republic of Iran, Jane's Intelligence Review, February 1993, pp. 76-80; Paul Wilkinson, "Terrorism, Iran, and the Gulf Region," Jane's Intelligence Review, May, 1992, pp. 222-226, pp. 76-80, and "Terrorist Trends in the Middle East," Jane's Intelligence

Review, February, 1993, pp. 222-226, pp. 73-75; Los Angeles Times, October 30, 1992, p. A-3.

[37] Washington Post, March 2, 1991, p. A-17; Washington Times, February 28, 1992, p. F-1, May 8, 1992, p. 9; Security Intelligence Report, November 4, 1991, p. 4; Economist, November 16, 1991, p. 51; UPI, January 14, 1992; Professor Paul Wilkinson, "Terrorism, Iran, and the Gulf Region ," Jane's Intelligence Review, May 1992, pp. 222-224.

[38] New York Times, December 31, 1991, p. A-7; Washington Post, March 2, 1991, p. A-17; Washington Times, February 28, 1992, p. F-1; Philadelphia Inquirer, January 16, 1992; Newsweek, February 24, 1992, p. 32.

[39] Defense News, March 2, 1992, p. 3 and 29; Washington Post, March 2, 1991, p. A-17, May 20, 1992, p. A-25, May 27, 1992, p. A-19; Washington Times, February 28, 1992, p. F-1; New York Times, February 22, 1992, p. A-4.

[40] Washington Post, August 20, 1993, p. A-26; Washington Times, April 12, 1993, p. A-7; September 3, 1993, p. 2; Baltimore Sun, August 15, 1993, p. 6-A; New York Times, April 13, 1993, p. A-5

[41] Congressional Quarterly, The Middle East, 7th Edition, Washington, Congressional Quarterly, 1990, p. 195.

[42] The high U.S. estimate is by James Placke, Cambridge Associates, October 29, 1993; Other estimates indicate that Iran has only 63 billion barrels of proven reserves and 52 billion barrels of probable reserves. See Joseph P. Riva, Jr. of the Congressional Research Service, writing in the Oil and Gas Journal, September 23, 1991, p. 62; Wall Street Journal, November 25, 1992, p. A-1; Paul Stevens, Oil and Politics: The Post-War Gulf, London, Royal Institute of International Affairs, 1992; Christian Science Monitor, June 22, 1993, p. 18.

[43] Petroleum Economist, Petroleum Finance Company, and Congressional Quarterly, The Middle East, 7th Edition, Washington, Congressional Quarterly, 1990, p. 195.

[44] Oil and Gas Journal, September 23, 1991, p. 62.

[45] Some estimates put Iran's 1991 oil revenues at about $15 billion and its domestic spending needs at $15 billion. Economist Intelligence Unit, Country Report on Iran, 1993; New York Times, February 11, 1992, p. A-11; Defense News, March 2, 1992, p. 3 and 29; Washington Post, September 10, 1991, p. A-21, February 2, 1992, p. A-1; Wall Street Journal, September 16, 1991, p. A-1; Washington Times, April 29, 1989, p. A-9; Jane's Defense Weekly, June 17, 1989, pp. 1254-1255; Los Angeles Times, January 13, 1992, p. A9.

[46] Wall Street Journal, June 7, 1993, p. A-10; Christian Science Monitor, August 12, 1993, p. 9.

[47] Estimates based on the data in the Iran sections of various editions of the CIA World Factbook; work by Jim Placke, and the IISS Military Balance, 1993-1994.

[48] This, however, only amounts to about 1,362 cubic meters per person, less than half the total for a citizen of the U.S. Los Angeles Times, January 28, 1992, p. C-1.

[49] IISS, Military Balance, 1990-1991 and 1991-1992 editions. The IISS has since quoted Iranian official government statistics.

[50] British sources quoted in Jane's Defense Weekly, February 1, 1992, p. 158. The Egyptian Gazette projected expenditures of $5 billion per year in 1992, 1993, and 1994 in its January 29, 1992, issue. The Jaffee Center estimated expenditures of $8.5 billion in 189 and $8.6 billion in 1990. Andrew Duncan of the IISS estimated expenditures of $10 billion annually in 1992, 1993, and 1994 in Defense News, January 27, 1992. The CIA estimate is taken from CIA, World Factbook, 1992, pp. 160-163. It is extremely difficult to relate any Iranian statistics to dollar figures because Iran uses multiple exchange rates, and often reports inaccurate statistics. See Patrick Clawson, Iran's Challenge to the West, How, When, and Why, Washington, The Washington Institute Policy Papers, Number Thirty Three, 1993. p. 58.

[51] Author's guesstimate. Iran claimed on February 1992 that it was spending only 1.3% of its GNP on defense. Washington Times, February 20, 1992, p. A-9.

[52] New York Times, November 2, 1992, p. A-4.

[53] Arms Control and Disarmament Agency (ACDA), World Military Expenditures and Arms Transfers, 1989, Washington, GPO, 1990, p. 117.

[54] Richard F. Grimmett, Conventional Arms Transfers to the Third World, 1985-1992, Washington, Congressional Research Service, CRS-93-656F, July 19, 1993, pp. CRS-56, 57, 58 and CRS-67, 68, 69, 70.

[55] Robert Gates, "Statement of the Director of Central Intelligence Before the U.S. House of Representatives Armed Services Committee Defense Policy Panel," March 27, 1992.

[56] Richard F. Grimmett, Conventional Arms Transfers to the Third World, 1985-1992, Washington,

Congressional Research Service, CRS-93-656F, July 19, 1993, pp. CRS-56, 57, 58 and CRS-67, 68, 69, 70.

[57] See Richard F. Grimmett, Conventional Arms Transfers to the Third World, 1983-1990, Washington, Congressional Research Service, CRS-91-578F, August 2,1991, pp. CRS-53, 54, 56, 57, 69, 70, 71, 72; Richard F. Grimmett, Conventional Arms Transfers to the Third World, 1984-1991, Washington, Congressional Research Service, CRS-92-577F, July 20, 1992, pp. CRS-57, 58, 59, 60, 69, 70, 71, 72; Richard F. Grimmett, Conventional Arms Transfers to the Third World, 1985-1992, Washington, Congressional Research Service, CRS-93-656F, July 19, 1993, pp. CRS-56, 57, 58 and CRS-67, 68, 69, 70.

[58] Based on discussions with the Richard Grimmett, and Middle East Economic Digest, April 30, 1993, pp. 2-3; The Middle East, April, 1993, pp. 36-37.

[59] Author's conversion from constant 1989 to constant 1993 dollars using OMB delfators, and the data on Iranian arms transfers in ACDA, World Military Expenditures and Arms Transfers, 1990, Washington, GPO, 1991, p. 109.

[60] Washington Post, March 28, 1992, p. A-1.

[61] The data on Iran's purchases are based on discussions with various U.S., British, and Israeli experts. Also see Robert Gates, "Statement of the Director of Central Intelligence Before the U.S. House of Representatives Armed Services Committee Defense Policy Panel," March 27, 1992; Washington Times, June 4, 1992, p. G-3; New York Times, August 8, 1992, p. 2; Sunday Times (London), May 31, 1992, pp. 22-23.

[62] Reports differ sharply. One indicated that the Soviet Republic was selling T-72s for as little as $50,000 each while another indicated that it was selling Iran a T-72 production plant for $9 billion. On the other hand, Marshal Yevgeny Shaposhnikov, the senior military officer in the CIS, stated that it had curbed all sales to Iran on February 1, 1992. Washington Post, February 1, 1992, p. A-1, February 2, 1992, p. A-19, June 16, 1992; Keyhan, April 18, 1990; Los Angeles Times, January 7, 1992, p. A-7; Patrick Clawson, Iran's Challenge to the West, How, When, and Why, Washington, The Washington Institute Policy Papers, Number Thirty Three, 1993, pp. 50-58; Le Monde, July 25, 1992; New York Times, August 8, 1992; Financial Times, January 30, 1992, March 22, 1992, and April 30, 1992; Washington Times, April 22, 1992, October 14 , 1992, p. A-8, May 11, 1993, p. A-7; MEED February 8, 1991, Sunday Telegraph, May 31, 1992.

[63] Washington Post, November 10, 1992, pp. A-1 and A-30, May 23, 1993, p. A-26, June 10, 1993, p. A-27; New York Times, November 18, 1992, p. A-5; Defense News, March 8, 1993, p. 4; Business Week, June 14, 1993, p. 31; Los Angeles Times, June 10, 1993, p. A-3; Washington Times, June 10, 1993, p. A-1; Philadelphia Inquirer, November 21, 1993, p. A-2.

[64] Northrop helped Iran set up an Iran Aircraft Industries in 1970, but this operation virtually ceased operation in 1979. See Jane's Defense Weekly, February 4, 1989, pp. 163 and 167, February 11, 1989, p. 219, November 19, 1988, pp. 1252-1253, June 30, 1989, pp. 1299-1301; February 11, 1992, p. 159; London Financial Times, February 8, 1993, p. 4; Time, December 7, 1992, p. 26; Washington Post, December 6, 1992, p. A-33; St. Louis Post-Dispatch, November 25, 1992, p. 6; New York Times, August 8, 1992, p. A-3; The Middle East, December, 1992, pp. 39-40; Defense and Foreign Affairs, October-November, 1992, p. 7.

[65] The Middle East, April 1993, pp. 36-37; Washington Post, November 10, 1992, p. A1, A-28 April 24, 1993, p. A-21, A-24, June 10, 1993, p. A-27; Flight International, 17-23 February, 1993, p. 4-5; New York Times, November 18, 1992, p. A-5, June 10, 1993, p. A-5.

[66] Iran has long been making light arms and ammunition. The Shah set up the Import Substitute Industrialization (ISI) program in 1970 with the goal of making Iran self-sufficient in arms.

[67] Jane's Defense Weekly, June 30, 1989, pp. 1299-1301.

[68] See Middle East Defense News, March 1, 1993, and JINSA Security Affairs, June/July 1993, p. 7.

[69] Based on CIA estimates. Sources disagree sharply on the exact percentages involved.

[70] CIA, World Factbook, 1992, pp. 160-163.

[71] Washington Post May 8, 1992, p. A-17; CIA, World Factbook, 1992, pp. 160-163.

[72] IISS, Military Balance, 1993-1994. While Iran occasionally shows women in military roles for propaganda purposes, it does not employ them in any meaningful military roles.

[73] Some estimates show totals for the Gendarmerie alone. This is incorrect. They have been merged with the national police and some elements of the internal security forces.

[74] In addition to the general sources on Iranian force strength referenced at the beginning of this section, this analysis draws on the Washington Times, May 2, 1989, p. A-9, June 23, 1989, p. A-9; March 1, 1992, p. B-

3, March 22, 1989, p. A-8, January 17, 1992, p. A-1, February 20, 1992, p. 9; Armed Forces Journal, March 1992, pp. 26-27; Defense Electronics, March, 1992, p. 16; Inside the Air Force, February 28, 1992, p. 1; Jane's Defense Weekly, November 19, 1988, pp. 1252-1253, June 3, 1988, p. 1057, February 11, 1989, p. 219, June 30, 1990, pp. 1299-1302, February 11, 1992, p. 158-159, ; Armed Forces (UK), May, 1989, pp. 206-209; Washington Post, June 23, 1989, p. A-1; August 18, 1989, p. A-25; August 20, 1989, p. A-1, September 3, 1989, p. A-25, February 1, 1992, p. A-1 February 2, 1992, p. A-1, February 5, 1992, p. A-19; New York Times, September 3, 1989, p. A-4; The Estimate, October 13-26, 1989, p. 1; Christian Science Monitor, February 6, 1992, p. 19; Philadelphia Inquirer, February 6, 1992, p. A-6; Los Angeles Times, January 7, 1992, p. A-1; Baltimore Sun, January 25, 1992, p. 4A; Defense News, January 27, 1922, p. 45, February 17, 1992, p. 1; Chicago Tribune, January 19, 1992, p. 1.

[75] The author visited this display in August after a substantial amount of the equipment had been moved to Jordan and to other areas. Even then, there were immense stocks of heavy weapons, almost all of which had been abandoned without any combat damage. It should be noted, however, that Iraq made claims about capturing tanks that seem to have included all light tanks and BMP-1s.

[76] In addition to the general sources on Iranian force strength referenced at the beginning of this section, this analysis draws on the Washington Times, May 2, 1989, p. A-9, June 23, 1989, p. A-9; March 1, 1992, p. B-3, March 22, 1989, p. A-8, January 17, 1992, p. A-1, February 20, 1992, p. 9; Armed Forces Journal, March 1992, pp. 26-27; Defense Electronics, March, 1992, p. 16; Inside the Air Force, February 28, 1992, p. 1; Jane's Defense Weekly, November 19, 1988, pp. 1252-1253, June 3, 1988, p. 1057, February 11, 1989, p. 219, June 30, 1990, pp. 1299-1302, February 11, 1992, p. 158-159, ; Armed Forces (UK), May, 1989, pp. 206-209; Washington Post, June 23, 1989, p. A-1; August 18, 1989, p. A-25; August 20, 1989, p. A-1, September 3, 1989, p. A-25, February 1, 1992, p. A-1 February 2, 1992, p. A-1, February 5, 1992, p. A-19; New York Times, September 3, 1989, p. A-4; The Estimate, October 13-26, 1989, p. 1; Christian Science Monitor, February 6, 1992, p. 19; Philadelphia Inquirer, February 6, 1992, p. A-6; Los Angeles Times, January 7, 1992, p. A-1; Baltimore Sun, January 25, 1992, p. 4A; Defense News, January 27, 1922, p. 45, February 17, 1992, p. 1; Chicago Tribune, January 19, 1992, p. 1.

[77] Washington Times, March 9, 1989, p. A-1 and March 22, 1989, p. A-8, May 2, 1989, p. A-9 June 23, 1989, p. A-9; Washington Post, June 23, 1989, p. A-1 Los Angeles Times, February 14, 1989, p. 5; Jane's Defense Weekly, February 4, 1989, pp. 163 and 167; February 11, 1992, p. 159.

[78] Jane's Defense Weekly, February 4, 1989, pp. 163 and 167; February 11, 1992, p. 159; Washington Times, June 23, 1989, p. A-9.

[79] Reports differed sharply. One indicated that the Soviet Republic was selling T-72s for as little as $50,000 each while another indicated that it was selling Iran a T-72 production plant for $9 billion. On the other hand, Marshal Yevgeny Shaposhnikov, the senior military officer in the CIS, stated that it had curbed all sales to Iran on February 1, 1992. Washington Post, February 1, 1992, p. A-1, February 2, 1992, p. A-19; Los Angeles Times, January 7, 1992, p. A-7.

[80] The identification of unit size and title is a major problem for all Middle Eastern Armies. Most do not have standard tables of organization and equipment, and unit titles may have little to do with the actual total manpower and equipment mix.

[81] Dr. Anoushiravan Ehteshami, "The Armed Forces of the Islamic Republic of Iran", Jane's Intelligence Review, February, 1993, pp. 76-79.

[82] Based on estimates by Israeli and U.S. civilian experts, and the IISS, The Military Balance, 1993-1994, IISS, London, 1993, pp. 115-117.

[83] These counts are very uncertain and mix interview and IISS data.

[84] Division, brigade, regiment, and battalion are Western terms applied to Iranian and Iraqi formations. Actual unit strengths and organization often have nothing to do with the titles applied in Western reporting.

[85] Adapted from interviews with U.S., British, and Israeli experts, Iranian exiles, the IISS, The Military Balance, 1993-1994, IISS, London, 1993, pp. 115-117; USNI Data Base. Military Technology, World Defense Almanac: The Balance of Military Power, Vol. XVII, Issue 1-1993, ISSN 0722-3226, pp. 139-142; and working data from the Jaffee Center for Strategic Studies and the Washington Times, January 16, 1992, p. G-4; Washington Post, February 1, 1992, p. A1, February 2, 1992, pp. A1 and A25, February 5, p. A-19; Financial Times, February 6, 1992, p. 4; Christian Science Monitor, February 6, 1992, p. 19; Defense News, February 17, 1992, p. 1.

[86] In addition to the general sources on Iranian force strength referenced in this section, this analysis draws

on the Washington Times, March 1, 1992, p. B-3, March 22, 1989, p. A-8, January 17, 1992, p. A-1, February 20, 1992, p. 9; Armed Forces Journal, March 1992, pp. 26-27; Defense Electronics, March, 1992, p. 16; Inside the Air Force, February 28, 1992, p. 1; Jane's Defense Weekly, February 11, 1992, p. 158-159, ; Armed Forces (UK), May, 1989, pp. 206-209; Washington Post, February 1, 1992, p. A-1 February 2, 1992, p. A-1, February 5, 1992, p. A-19; The Estimate, ; Christian Science Monitor, February 6, 1992, p. 19; Philadelphia Inquirer, February 6, 1992, p. A-6; Los Angeles Times, January 7, 1992, p. A-1; Baltimore Sun, January 25, 1992, p. 4A; Defense News, January 27, 1922, p. 45, February 17, 1992, p. 1; Chicago Tribune, January 19, 1992, p. 1.

[87] See the analysis in the author's The Lessons of Modern War, Volume II, Boulder, Westview, 1990 for a more detailed analysis.

[88] Based on interviews with British, Israeli, and U.S. experts., and the IISS, The Military Balance, 1993-1994, IISS, London, 1993, pp. 115-117; USNI Data Base. Military Technology, World Defense Almanac: The Balance of Military Power, Vol. XVII, Issue 1-1993, ISSN 0722-3226, pp. 139-142; and working data from the Jaffee Center for Strategic Studies. U.S. and Israeli experts do not confirm reports that Iran has ordered and taken delivery on 12 TU-22M Backfire bombers. There are some indications that it may have discussed such orders with the USSR.

[89] Dr. Anoushiravan Ehteshami, "The Armed Forces of the Islamic Republic of Iran", Jane's Intelligence Review, February, 1993, pp. 76-79.

[90] Based on interviews with British, Israeli, and U.S. experts. Washington Times, January 16, 1992, p. G-4; Washington Post, February 1, 1992, p. A1, February 2, 1992, pp. A1 and A25, February 5, p. A-19; Financial Times, February 6, 1992, p. 4; Christian Science Monitor, February 6, 1992, p. 19; Defense News, February 17, 1992, p. 1; Flight International, February 17-23, 1992, p. 4.

[91] See London Financial Times, February 8, 1993, p. 4. Northrop helped Iran set up an Iran Aircraft Industries in 1970, but this operation virtually ceased operation in 1979.

[92] Washington Times, January 16, 1992, p. G-4; Washington Post, February 1, 1992, p. A1, February 2, 1992, pp. A1 and A25, February 5, p. A-19; Financial Times, February 6, 1992, p. 4; Christian Science Monitor, February 6, 1992, p. 19; Defense News, February 17, 1992, p. 1; Jane's Defense weekly, February 1, 1992, p. 159.

[93] Dick Pawloski, Changes in Threat Air Combat Doctrine and Force Structure, 24th Edition, General Dynamics DWIC-91, Fort Worth Division, February, 1992, pp. I-85 to 1-117.

[94] Dick Pawloski, Changes in Threat Air Combat Doctrine and Force Structure, 24th Edition, General Dynamics DWIC-91, Fort Worth Division, February, 1992, pp. I-85 to 1-117.

[95] Dick Pawloski, Changes in Threat Air Combat Doctrine and Force Structure, 24th Edition, General Dynamics DWIC-91, Fort Worth Division, February, 1992, pp. I-85 to 1-117.

[96] Aviation Week and Space Technology, April 10, 1989, pp. 19-20; New York Times, April 5, 1989, September 7, 1989; Washington Times, January 16, 1989; FBIS/NES, April 10, 1989.

[97] The Su-24 has a wing area of 575 square feet, an empty weight of 41,845 pounds, carries ,3385 gallons or 22,000 pounds of fuel, has a take off weight of 871,570 pounds with bombs and two external fuel tanks, carries 2,800 gallons or 18,200 pounds of external fuel, has a combat thrust to weight ratio of 1.02, a combat wing loading of 96 pounds per square foot, and a maximum load factor of 7.5G. Jane's Soviet Intelligence Review, July, 1990, pp. 298-300; Jane's Defense Weekly, June 25, 1985, pp. 1226-1227; and Dick Pawloski, Changes in Threat Air Combat Doctrine and Force Structure, 24th Edition, General Dynamics DWIC-91, Fort Worth Division, February, 1992, pp. I-65 and I-110 to 1-117.

[98] Dick Pawloski, Changes in Threat Air Combat Doctrine and Force Structure, 24th Edition, General Dynamics DWIC-91, Fort Worth Division, February, 1992, pp. I-65 and I-110 to 1-117.

[99] Jane's Defense Weekly, April 27, 1991, p. 684.

[100] IISS, The Military Balance, 1993-1994, IISS, London, 1993, pp. 115-117; USNI Data Base. Military Technology, World Defense Almanac: The Balance of Military Power, Vol. XVII, Issue 1-1993, ISSN 0722-3226, pp. 139-142; and working data from the Jaffee Center for Strategic Studies.

[101] Based on interviews with British, Israeli, and U.S. experts., and the IISS, The Military Balance, 1993-1994, IISS, London, 1993, pp. 115-117; USNI Data Base. Military Technology, World Defense Almanac: The Balance of Military Power, Vol. XVII, Issue 1-1993, ISSN 0722-3226, pp. 139-142; and working data from the Jaffee Center for Strategic Studies.

[102] Source: USAF briefing, September, 1981. One B-727 and 2 B-767ERs are unaccounted for.

[103] In addition to the general sources on Iranian force strength referenced at the beginning of this section, this analysis draws on the Washington Times, May 2, 1989, p. A-9, June 23, 1989, p. A-9; March 1, 1992, p. B-3, March 22, 1989, p. A-8, January 17, 1992, p. A-1, February 20, 1992, p. 9; Armed Forces Journal, March 1992, pp. 26-27; Defense Electronics, March, 1992, p. 16; Inside the Air Force, February 28, 1992, p. 1; Jane's Defense Weekly, November 19, 1988, pp. 1252-1253, June 3, 1988, p. 1057, February 11, 1989, p. 219, June 30, 1990, pp. 1299-1302, February 11, 1992, p. 158-159, ; Armed Forces (UK), May, 1989, pp. 206-209; Washington Post, June 23, 1989, p. A-1; August 18, 1989, p. A-25; August 20, 1989, p. A-1, September 3, 1989, p. A-25, February 1, 1992, p. A-1 February 2, 1992, p. A-1, February 5, 1992, p. A-19; New York Times, September 3, 1989, p. A-4; The Estimate, October 13-26, 1989, p. 1; Christian Science Monitor, February 6, 1992, p. 19; Philadelphia Inquirer, February 6, 1992, p. A-6; Los Angeles Times, January 7, 1992, p. A-1; Baltimore Sun, January 25, 1992, p. 4A; Defense News, January 27, 1922, p. 45, February 17, 1992, p. 1; Chicago Tribune, January 19, 1992, p. 1.

[7]2 Based on interviews with British, Israeli, and U.S. experts., and the IISS, The Military Balance, 1993-1994, IISS, London, 1993, pp. 115-117; USNI Data Base. Military Technology, World Defense Almanac: The Balance of Military Power, Vol. XVII, Issue 1-1993, ISSN 0722-3226, pp. 139-142; and working data from the Jaffee Center for Strategic Studies.

[105] Adapted from the IISS, Annapolis, and JCSS data bases, and the Washington Times, January 16, 1992, p. G-4; Washington Post, February 1, 1992, p. A1, February 2, 1992, pp. A1 and A25, February 5, p. A-19; Financial Times, February 6, 1992, p. 4; Christian Science Monitor, February 6, 1992, p. 19; Defense News, February 17, 1992, p. 1

[106] Based on interviews with British, Israeli, and U.S. experts. Reports of MiG-31s do not seem to be correct. Adapted from the IISS, Annapolis, and JCSS data bases, and the Washington Times, January 16, 1992, p. G-4; Washington Post, February 1, 1992, p. A1, February 2, 1992, pp. A1 and A25, February 5, p. A-19; Financial Times, February 6, 1992, p. 4; Christian Science Monitor, February 6, 1992, p. 19; Defense News, February 17, 1992, p. 1

[107] Defense News, July 12, 193, p. 1.

[108] Flight International, August 24, 1993, p. 12.

[109] Based on interviews with British, U.S., and Israel experts. Washington Times, January 16, 1992, p. G-4; Washington Post, February 1, 1992, p. A1, February 2, 1992, pp. A1 and A25, February 5, p. A-19; Financial Times, February 6, 1992, p. 4; Christian Science Monitor, February 6, 1992, p. 19; Defense News, February 17, 1992, p. 1

[110] In addition to the general sources on Iranian force strength referenced at the beginning of Chapter III, this analysis draws on U.S. Naval Institute, The Naval Institute Guide to the Combat Fleets of the World, 1993: Their Ships, Aircraft, and Armament, Annapolis, Naval Institute, 1993; John Jordan, "The Iranian Navy," Jane's Intelligence Review, May 1992, pp. 213-216; the Washington Times, May 2, 1989, p. A-9, June 23, 1989, p. A-9; March 1, 1992, p. B-3, March 22, 1989, p. A-8, January 17, 1992, p. A-1, February 20, 1992, p. 9; Armed Forces Journal, March 1992, pp. 26-27; Defense Electronics, March, 1992, p. 16; Inside the Air Force, February 28, 1992, p. 1; Jane's Defense Weekly, November 19, 1988, pp. 1252-1253, June 3, 1988, p. 1057, February 11, 1989, p. 219, June 30, 1990, pp. 1299-1302, February 11, 1992, p. 158-159, ; Armed Forces (UK), May, 1989, pp. 206-209; Washington Post, June 23, 1989, p. A-1; August 18, 1989, p. A-25; August 20, 1989, p. A-1, September 3, 1989, p. A-25, February 1, 1992, p. A-1 February 2, 1992, p. A-1, February 5, 1992, p. A-19; New York Times, September 3, 1989, p. A-4; The Estimate, October 13-26, 1989, p. 1; Christian Science Monitor, February 6, 1992, p. 19; Philadelphia Inquirer, February 6, 1992, p. A-6; Los Angeles Times, January 7, 1992, p. A-1; Baltimore Sun, January 25, 1992, p. 4A; Defense News, January 27, 1922, p. 45, February 17, 1992, p. 1; Chicago Tribune, January 19, 1992, p. 1.

[111] Larry Dickerson, "Iranian Power Projection in the Persian Gulf", World Weapons Review, August 12, 1987, p. 7.

[112] FBIS-NES-89-144, July 28, 1989, p. 51; FBIS-NES-89-191, October 4, 1989, p. 66, FBIS-NES-89-206, October 26, 1989, p. 66, FBIS-NES-89-214, November 7, 1989, p. 73; International Defense Review, June 1990, pp. 51-52.

[113] This analysis draws heavily on U.S. Naval Institute, The Naval Institute Guide to the Combat Fleets of the World, 1993, Their Ships, Aircraft, and Armament, Annapolis, Naval Institute, 1993; Jane's Fighting Ships, 1992-1993; IISS, The Military Balance, 1993-1994, IISS, London, 1993, pp. 115-117; USNI Data

Base. Military Technology, World Defense Almanac: The Balance of Military Power, Vol. XVII, Issue 1-1993, ISSN 0722-3226, pp. 139-142. USNI Data Base; Washington Times, January 16, 1992, p. G-4; Washington Post, February 1, 1992, p. A1, February 2, 1992, pp. A1 and A25, February 5, p. A-19; Financial Times, February 6, 1992, p. 4; Christian Science Monitor, February 6, 1992, p. 19; Defense News, February 17, 1992, p. 1, and working data from the Jaffee Center for Strategic Studies.

[114] Adapted from the IISS, Annapolis, and JCSS data bases, and the Washington Times, January 16, 1992, p. G-4; Washington Post, February 1, 1992, p. A1, February 2, 1992, pp. A1 and A25, February 5, p. A-19; Financial Times, February 6, 1992, p. 4; Christian Science Monitor, February 6, 1992, p. 19; Defense News, February 17, 1992, p. 1.

[8]3 IISS, The Military Balance, 1993-1994, IISS, London, 1993, pp. 115-117; USNI Data Base. Military Technology, World Defense Almanac: The Balance of Military Power, Vol. XVII, Issue 1-1993, ISSN 0722-3226, pp. 139-142; and working data from the Jaffee Center for Strategic Studies.

[116] The submarines are based on World War II designs. They can lay mines, have a five man crew, have a maximum range of 1,200 miles, and have a speed of 6 knots. Iran claims to have made one of the submarines. The first underwent trials in 1987. The second was delivered in 1988. These ships are difficult to use in mine laying and often require frogmen to place the mines. It is not surprising if Iran abandoned them as lacking effectiveness once the Iran-Iraq War was over. Jane's, Fighting Ships, 1992-1993, London, Jane's Publishing; Naval Institute data base.

[117] Washington Times, January 16, 1992, p. G-4; Washington Post, February 1, 1992, p. A-1, February 2, 1992, pp. A-1 and A-25, February 5, p. A-19, September 26, 1992, p. A-15, October 2, 1992, p. A-40, October 30, 1992, p. A-1, November 5, 1992, p. A-3; Financial Times, February 6, 1992, p. 4; Christian Science Monitor, February 6, 1992, p. 19; Defense News, February 17, 1992, p. 1; Defense News, February 17, 1992, p. 1, March 1, 1993, p. 1; Time, December 7, 1992, p. 26; The Wall Street Journal, November 16, 1992, p. A-4; Jane's Defense Weekly, October 3, 1992, p. 12, November 21, 1992, p. 9, February 27, 1992, p. 9; London Times, October 5, 1992, p. 9.

[118] Washington Post, August 4, 1993, p. A-12; Washington Times, June 120, 1993, p. A-2.

[119] Only two torpedo tubes can fire wire guided torpedoes.

[120] Defense News, December 6, 1993, p. 1.

[121] See David Miller, "Submarines in the Gulf," Military Technology, 6/93, pp. 42-45.

[122] Jane's Defense Weekly, June 6, 1987, p. 1113; Dick Palowski, Changes in Threat Air Combat Doctrine and Force Structure, 24th Edition, Fort Worth, General Dynamics DWIC-01, February, 1992, pp. 11-275 to 11-275.

[123] Washington Times, March 9, 1989, p. A-1, May 11, 1993, p. A-7; Los Angeles Times, February 14, 1989, p. 5.

[124] Dr. Anoushiravan Ehteshami, "The Armed Forces of the Islamic Republic of Iran", Jane's Intelligence Review, February, 1993, pp. 76-79; Gordon Jacobs and Tim McCarthy, "China Missile Sales -- Few Changes for the Future," Jane's Intelligence Review, December, 1992, pp. 559-563.

[125] There have been unconfirmed reports that Iran is seeking to modify the Silkworm to extend its range and use it to deliver weapons of mass destruction.

[126] In addition to the sources listed at the start of this section, these assessments are based on various interviews, prior editions of the IISS Military Balance; the Jaffee Center Middle East Military Balance, and Jane's Defense Weekly, July 11, 1987, p. 15.

[127] Counts of these vessels differ sharply. Some estimates of the number of operational PBI types exceed 60. There are some reports that Iran is building its own version of the Boghammer.

[128] Based on various interviews. strength data are taken from IISS, The Military Balance, 1993-1994, IISS, London, 1993, pp. 115-117; USNI Data Base. Military Technology, World Defense Almanac: The Balance of Military Power, Vol. XVII, Issue 1-1993, ISSN 0722-3226, pp. 139-142; and working data from the Jaffee Center for Strategic Studies.

[129] CIA, World Factbook, 1992, p. 160; New York Times, April 20, 1992, p. A-8.

[130] New York Times, October 25, 1992, p. 15; Washington Post, November 2, 1992, p. A-18, November 15, 1992, p. A-33.

[131]New York Times, April 20, 1992, p. A-8.

[132] New York Times, November 15, 1992, p. A-9, May 6, 1993, p. A-6

[133] Letter from Wendy R. Sherman, Assistant Secretary for Legislative Affairs, to Senator John McCain.

[134] Based on interviews with British, Israeli, and U.S. experts, the IISS, The Military Balance, 1993-1994, IISS, London, 1993, pp. 115-117; Philadelphia Inquirer, June 9, 1993, p. A-9; Washington Post, July 17, 1993, p. A-10.

[135] Armed Forces Journal, March, 1992, pp. 26-28; Washington Times, January 16, 1992, p. G-4, April 6, 1992, p. 8; Washington Post, April 8, 1992, p. A-19.

[136] Washington Post, ; New York Times, May 26, 1993, p. A-8, July 17, 1993, p. A-14, Agence France Presse, April 12, 1993, May 15, 1993, July 19, 1993, BBC ME/1664/A, April 16, 1993, ME/1721/A, June 22, 1993 ; Armed Forces Journal, July, 1992, p. 23; Christian Science Monitor, ; Financial Times, May 26, 12993, p. 6 ; Washington Times, April 12, 1993, p. A-2.

[137] The following details of the Iranian missile program are taken from W. Seth Carus and Joseph S. Bermudez, "Iran's Growing Missile Forces," Jane's Defense Weekly, July 23, 1988, pp. 126-131.

[138] Iran publicly displayed the Oghab at a military show in Libreville in 1989. It is 230 mm in diameter, 4,820 mm long, and weighs 320 kilograms, with a 70 kilogram warhead. Iran also displayed another rocket called the Nazeat, which is 355 mm in diameter, 5,900 mm long, weighs 950 kilograms and has a 180 kilogram warhead. Jane's Defense Weekly, February 11, 1989, p. 219; Lora Lumpe, Lisbeth Gronlund, and David C. Wright, "Third World Missiles Fall Short," The Bulletin of the Atomic Scientists, March, 1992, pp. 30-36.

[139] Jane's Defense Weekly, June 20, 1987, p. 1289; Lora Lumpe, Lisbeth Gronlund, and David C. Wright, "Third World Missiles Fall Short," The Bulletin of the Atomic Scientists, March, 1992, pp. 30-36.

[140] Some estimates indicate a range of up to 200 kilometers. For background on the system, see Financial Times, June 8, 1988, p. 20, and The Middle East, April 1988, pp. 1 and 18.

[141] The reader should be aware that all such performance data are nominal, and that various source report significant differences in given performance characteristics.

[142] CRS Report for Congress, Missile Proliferation: Survey of Emerging Missile Forces, Congressional Research Service, Report 88-642F, February 9, 1989, pp. 52-53.

[143] Edward L. Korb Editor, The World's Missile Systems, Seventh Edition, General Dynamics, Pomona Division, April, 1982, pp. 223-226.

[144] The following details of the Iranian missile program are taken from W. Seth Carus and Joseph S. Bermudez, "Iran's Growing Missile Forces," Jane's Defense Weekly, July 23, 1988, pp. 126-131; Dr. Anoushiravan Ehteshami, "The Armed Forces of the Islamic Republic of Iran", Jane's Intelligence Review, February, 1993, pp. 76-79; Gordon Jacobs and Tim McCarthy, "China Missile Sales -- Few Changes for the Future," Jane's Intelligence Review, December, 1992, pp. 559-563; Jane's Intelligence Review, Vol. 4, No. 5, pp. 218-222; Jane's Intelligence Review, Vol. 4, No. 4, p. 149.

[145] Iran had to target an inherently inaccurate missile without the kind of maps, satellite aids, and other targeting systems to correct for the fact the world is not perfectly round, and the inevitable bias errors in the missile's guidance systems. Beyond visual range targeting in excess of 200 miles is a major problem for nations without extensive test ranges and satellite or other advanced intelligence systems.

[146] Dr. Robert A, Nagler, Ballistic Missile Proliferation: An Emerging Threat; Systems Planning Corporation, Arlington, 1992.

[147] Baltimore Sun, March 9, 1989; New York Times, March 12, 1992, p. A-12, March 18, 1992, p. A-12; Washington Post, February 2, 1992, p. A-1; Lora Lumpe, Lisabeth Gronlund, and David C. Wright, "Third World Missiles Fall Short," The Bulletin of the Atomic Scientists, March 1992, p. 30-36; "North Korea Corners ME Missile Market," Mednews, Vol. 5,16, May 18, 1992, pp. 1-5; Newsweek, June 22, 1992, pp. 42-44; Gordon Jacobs and Tim McCarthy, "China Missile Sales -- Few Changes for the Future," Jane's Intelligence Review, December, 1992, pp. 559-563; Jerusalem Post, November 6, 1993, p. 24.

[148] Iran allowed a Northern Korean freighter, the Dae Hung Ho, to dock at Bandar Abbas and transshipped to missiles by air. Syria is reported to have allowed Iran to deliver arms to the Hizbollah and Party of God in Lebanon in return. Defense News, October 16, 1989, p.60; Washington Times, June 18, 1990, p. A1, March 10, 1992, p. A-3; Lora Lumpe, Lisbeth Gronlund, and David C. Wright, "Third World Missiles Fall Short," The Bulletin of the Atomic Scientists, March, 1992, pp. 30-36; Mednews, Vol. 5,16, May 18, 1992, pp. 1-5; Newsweek, June 22, 1992, pp. 42-44; Washington Times, May 24, 1991, p. 5, October 23, 1993, p. A-6; Gordon Jacobs and Tim McCarthy, "China Missile Sales -- Few Changes for the Future," Jane's Intelligence Review, December, 1992, pp. 559-563; Wall Street Journal, July 19, 1993, p. A-6; New York Times, April 8, 1993, p. A-9; Jane's Defense Weekly, July 24, 1993, p. 7; Aviation Week, July 5, 1993, p. 17.

[149] See "Iran's Ballistic Missile Program," Middle East Defense News, Mednews, December 21, 1992, Vol. 6, No. 6; Gordon Jacobs and Tim McCarthy, "China Missile Sales -- Few Changes for the Future," Jane's Intelligence Review, December, 1992, pp. 559-563; James Wyllie, "Iran - Quest for Security and Influence," Jane's Intelligence Review, July 1993, pp. 311-312; and material in Patrick Clawson, Iran's Challenge to the West, How, When, and Why, Washington, The Washington Institute Policy Papers, Number Thirty Three, 1993; Dr. Anoushiravan Ehteshmi, "The Armed Forces of the Islamic Republic of Iran," Jane's Intelligence Review, February 1993, pp. 76-80.

[150] Jane's Defense Weekly, 30 January 1993, pp. 20-21; Defense Electronics and Computing, IDR press, September 1992, pp. 115-120, International Defense Review, May, 1992, pp. 413-415; Jane's Remotely Piloted Vehicles, 1991-1992; Keith Munson, World Unmanned Aircraft, London, Jane's 1988; Air Force Magazine, March, 1992, pp. 94-99, May, 1992, p. 155; Alan George, "Iran: Cut-price cruise missiles," , March, 1993, pp. 15-16.

[151] The technical content of this discussion is adapted in part from the author's discussion of the technical aspects of such weapons in After the Storm: The Changing Military Balance in the Middle East, Boulder, Westview, 1993; working material on biological weapons prepared for the United Nations, and from Office of Technology Assessment, Proliferation of Weapons of Mass Destruction: Assessing the Risks, United States Congress OTA-ISC-559, Washington, D.C., August, 1993; Kenneth R. Timmerman, Weapons of Mass Destruction: The Cases of Iran, Syria, and Libya, Simon Wiesenthal Center, Los Angeles, August, 1992; Dr. Robert A, Nagler, Ballistic Missile Proliferation: An Emerging Threat; Systems Planning Corporation, Arlington, 1992; and translations of unclassified documents on proliferation by the Russian Foreign Intelligence Bureau provide to the author by the staff of the Government Operations Committee of the U.S. Senate.

[152] For a detailed history and list of suppliers see the author's Weapons of Mass Destruction in the Middle East, London, Brassey's, 1991, and After the Storm: The Changing Military Balance in the Middle East, Boulder, Westview, 1993.

[153] General references for this section include "Chemical and Biological Warfare," Hearing Before the Committee on Foreign Relations, U.S. Senate, 91st Congress, April 30, 1969; Department of Political and Security Council Affairs, Chemical and Bacteriological (Biological) Weapons and the Effects of Their Possible Use, Report of the Secretary General, United Nations, New York, 1969; unpublished testimony of W. Seth Carus before the Committee on Governmental Affairs, U.S. Senate, February 9, 1989; W. Seth Carus, "Chemical Weapons in the Middle East," Policy Focus, Number Nine, Washington Institute for Near East Policy, December, 1988; unpublished testimony of Mr. David Goldberg, Foreign Science and Technology Center, U.S. Army Intelligence Agency, before the Committee on Governmental Affairs, U.S. Senate, February 9, 1989; unpublished testimony of Dr. Barry J. Erlick, Senior Biological Warfare Analyst, U.S. Army, before the Committee on Governmental Affairs, U.S. Senate, February 9, 1989; unpublished testimony of Dr. Robert Mullen Cook-Deegan, Physicians for Human Rights, before the Committee on Governmental Affairs, U.S. Senate, February 9, 1989; Elisa D. Harris, "Chemical Weapons Proliferation in the Developing World," RUSI and Brassey's Defense Yearbook, 1989, London, 1988, pp. 67-88; and "Winds of Death: Iraq's Use of Poison Gas Against Its Kurdish Population", Report of a Medical Mission to Turkish Kurdistan by Physicians for Human Rights, February, 1989.

[154] Iran was caught trying to by 430 drums of Thiodiglycol feedstock in April, 1988, for a U.S. firm called Alcolac. Baltimore Sun, February 11, 1988, p. 6; Kenneth R. Timmerman, Weapons of Mass Destruction: The Cases of Iran, Syria, and Libya, Simon Wiesenthal Center, Los Angeles, August, 1992, pp. 28-45.

[155] While rumors surfaced in November, 1986, that Iran had bought nerve gas bombs and warheads from Libya -- which had obtained such weapons from the USSR-- these reports were almost certainly false. Iran does not seem to have used nerve gas at any time during the conflict.

[156] Unpublished "Statement of the Honorable William H. Webster, Director, Central Intelligence Agency, Before the Committee on Governmental Affairs, Hearings on Global Spread of Chemical and Biological Weapons, February 9, 1989.

[157] Unpublished "Statement of the Honorable William H. Webster, Director, Central Intelligence Agency, Before the Committee on Governmental Affairs, Hearings on Global Spread of Chemical and Biological Weapons, February 9, 1989.

[158] Unpublished "Statement of the Honorable William H. Webster, Director, Central Intelligence Agency, Before the Committee on Governmental Affairs, Hearings on Global Spread of Chemical and Biological

Weapons, February 9, 1989. For a description of the role of chemical warfare in the Iran-Iraq War see the author's Lessons of Modern Warfare, Volume II, Boulder, Westview, 1988.

[159] IRNA (English) October 19, 1988, as reported in FBIS, Near East and South Asia, October 19, 1988, pp. 55-56.

[160] Journal of Commerce, January 6, 1993, p. 5A; Washington Post, January 6, 1992, p. A-22, September 3, 1993, p. A-33; Washington Times, August 14, 1993, p. A-2; New York Times, August 9, 1993, p. A-6; Defense News, September 27, 1993, p. 23.

[161] Based on discussions with various experts, the sources listed earlier, and working papers by Leonard Spector; Observer, June 12, 1988; U.S. News and World Report, February 12, 1990; FBIS-NES, March 23, 1990, p. 57; Defense and Foreign Affairs, November 20, 1989, p. 2; New York Times, July 1, 1989, May 9, 1989, June 27, 1989; Financial Times, February 6, 1992, p. 3.

[162] Such reports begin in the SIPRI Yearbooks in 1982, and occur sporadically through the 1988 edition.

[163] New York Times, August 13, 1989, p. 11.

[164] James Smith, "Biological Weapons Developments," Jane's Intelligence Review, November, 1991, pp. 483-487; New York Times, August 13, 1989, p. 11; Kenneth R. Timmerman, Weapons of Mass Destruction: The Cases of Iran, Syria, and Libya, Simon Wiesenthal Center, Los Angeles, August, 1992, pp. 28-45.

[165] The technical content of this discussion is adapted in part from the author's discussion of the technical aspects of such weapons in After the Storm: The Changing Military Balance in the Middle East, Boulder, Westview, 1993; working material on biological weapons prepared for the United Nations, and from Office of Technology Assessment, Proliferation of Weapons of Mass Destruction: Assessing the Risks, United States Congress OTA-ISC-559, Washington, D.C., August, 1993; Kenneth R. Timmerman, Weapons of Mass Destruction: The Cases of Iran, Syria, and Libya, Simon Wiesenthal Center, Los Angeles, August, 1992; Dr. Robert A, Nagler, Ballistic Missile Proliferation: An Emerging Threat; Systems Planning Corporation, Arlington, 1992; and translations of unclassified documents on proliferation by the Russian Foreign Intelligence Bureau provide to the author by the staff of the Government Operations Committee of the U.S. Senate.

[166] Office of Technology Assessment, Proliferation of Weapons of Mass Destruction, Washington D.C., GPO, August, 1993, especially p. 53.

[167] For a detailed history and list of suppliers see the author's Weapons of Mass Destruction in the Middle East, London, Brassey's, 1991, and After the Storm: The Changing Military Balance in the Middle East, Boulder, Westview, 1993.

[168] Working papers by Leonard Spector, Daniel Poneman, Nuclear Power in the Developing World, London, Allen and Unwin, 1982, Chapter 5; "Iran's Nuclear Weapons Program," Mednews, Vol. 5,17/18, June 8, 1992, pp. 1-7.

[169] Some reports indicate that one reactor at Bushehr was 80% complete.

[170] Much of this analysis is based on research by Leonard Spector of the Carnegie Endowment.

[171] The lasers were exported by a firm headed by Dr. Jeffrey Earkens, who had worked on classified laser enrichment technology. They seem to have been exported filled with gases that did not produce the optimal wave length for nuclear enrichment, but could be refilled with the gases necessary to produce the required wave length.

[172] Los Angeles Times, August 22, 1979; Leonard Spector, Going Nuclear, Cambridge, Ballinger, 1987, pp. 47-53' Shyam Bhatia, Nuclear Rivals in the Middle East, London, Routledge, 1988, p. 85; JPRS-NTD, December 23, 1989.

[173] Observer, May 17, 1987.

[174] Yellow cake is not subject to IAEA inspection. Kenneth R. Timmerman, Weapons of Mass Destruction: The Cases of Iran, Syria, and Libya, Simon Wiesenthal Center, Los Angeles, August, 1992, pp. 28-45.

[175] Working papers by Leonard Spector and Washington Post, April 12, 1987.

[176] Uranium dioxide is normally subject to IAEA safeguards and inspection, but Argentine compliance is uncertain. Argentina sold at least three metric tons to Algeria in January, 1986. Nucleonics Week, May 7, 1987, p. 6

[177] Washington Times, April 22, 1987, page 6; Economist, "Foreign Report", April 2, 1987, p. 7; "Iran's Nuclear Weapons Program," Mednews, Vol. 5,17/18, June 8, 1992, pp. 1-7.

[178] Many of the details on these aspects of the Iranian effort are drawn from working papers provided by

Leonard Spector of the Carnegie Endowment, and Warren Donnelly of the Congressional Research Service. Also see Nucleonics Week, November 19, 1987, p. 1; November 26, 1987, p. 5; March 3, 1988, p. 7; July 28, 1988, p. 15

[179] For a range of typical reporting on Iran, see Nucleonics Week, February 13, 1992, p. 12, March 26, 1992, p. 7, May 28, 1992, p. 3, August 6, 1992, p. 13, August 20, 1992, p. 7, September 24, 1992, p. 2; Nuclear Fuel, July 6, 1992, p. 17, December 7, 1992, p. 5; Nuclear News, April, 1992, p. 67; Los Angeles Times, January 29, 1992, p. A-4, March 21, 1992, p. A-1; Washington Post, October 18, 1992, p. C-5.

[180] The U.S. had supplied 11 pounds of 93% enriched uranium in the mid-1970s, but this was largely depleted and could not keep the reactor running continuously. Base upon work by Leonard Spector; Nucleonics Week, May 14 ,1989, p. 2; Observer, March 6, 1988.

[181] Reuters, February 7, 1992, AM Cycle, and Rio Negro, February 7, 1992; Washington Post, November 17, 1992, pp. A-1 to A-30.

[182] Nuclear Engineering International, March, 1990, p. 3.

[183] Tehran Domestic Service, March 7, 1990; Nuclear News, April 1990, p. 19; Nuclear Engineering International, May, 1990, p. 7

[184] Korea Times, March 2, 1990; Patrick Clawson, Iran's Challenge to the West, How, When, and Why, Washington, The Washington Institute Policy Papers, Number Thirty Three, 1993, p. 62; Tehran Radio, March 7, 1990; Akhbaar, March 7, 1990; New York Times, September 11, 1992, p. A-3; Washington Times, August 13, 1992, p. G-3, November 17, 1992, p. A-30; Mednews, September 14, 1992, p. 2; Journal of Commerce, April 2, 1993, p. 10B; Wall Street Journal, May 11, 1993, p. A-14.

[185] Washington Post, November 15, 1991, p. A-33; Agence France Presse, November 20, 1991; AP AM Cycle, November 15, 1991; "Iran's Nuclear Weapons Program," Mednews, Vol. 5,17/18, June 8, 1992, pp. 1-7.

[186] Patrick Clawson, Iran's Challenge to the West, How, When, and Why, Washington, The Washington Institute Policy Papers, Number Thirty Three, 1993, pp. 62-63; New York Times, September 11, 1992; Iran Times, September 18, 1992; Los Angeles Times, January 18, 1993, p. A-1, March 17, 1992, p. A-1; London Financial Times, September 11, 1992, p. 6; Washington Times, September 11, 1992, p. 2; Washington Post, September 11, 1992, p. A-13, Jerusalem Post, September 26, 1992, p. 1.

[187] Nuclear Fuel, November 25, 1991, p. 8; Washington Post, November 17, 1992, pp. A-1 to A-30.

[188] The agreement made under the Shah was have given Iran about 250-300 metric tons of Uranium enriched to 3%. During 1980-1990, Iran refused to accept the material or pay for it. When Iran did ask for the material in 1991, France used the fact that Iran's option to obtain enriched material for its investment had expired to deny Iran shipment of the material guaranteed under the original terms of the Iranian investment. Washington Times, November 15, 1991, p. F-4; David Albright and Mark Hibbs, "Spotlight Shifts to Iran," Bulletin of the Atomic Scientists, March, 1992, pp. 9-12.

[189] Washington Post, April 12, 1987, p. D-1; James Bruce, "Iraq and Iran: Running the Nuclear Technology Race," Jane's Defense Weekly, December 5, 1988, p. 1307; working papers by Leonard Spector; JPRS-TND, October 6, 1989, p. 19.

[190] El Independiente, Madrid, February 5 and 6, 1990; FBIS-Middle East, December 1, 1988.

[191] El Independiente, Madrid, February 5 and 6, 1990; FBIS-Middle East, December 1, 1988.

[192] Working papers by Leonard Spector; Observer, June 12, 1988; U.S. News and World Report, February 12, 1990; FBIS-NES, March 23, 1990, p. 57; FBIS-EAS, December 9, 1989, December 11, 1989; Defense and Foreign Affairs, November 20, 1989, p. 2; New York Times, May 8, 1989, June 27, 1989.

[193] FBIS-Near East, December 1, 1988 and April 4, 1989; David Albright and Mark Hibbs, "Spotlight Shifts to Iran," Bulletin of the Atomic Scientists, March, 1992, pp. 9-12; Washington Post, November 18, 1992.

[194] Washington Times, November 6, 1991, p. F-4, November 1, 1991, p. 7; Los Angeles Times, October 31, 1991, p. B-4, March 17, 1992, p. 1; David Albright and Mark Hibbs, "Spotlight Shifts to Iran," Bulletin of the Atomic Scientists, March, 1992, pp. 9-12; Washington Post, October 31, 1991, p. 1, January 12, 1992, p. C-7, February 2, 1992, p. A-1, September 12, 1992, p. A-13; "Iran's Nuclear Weapons Program," Mednews, Vol. 5,17/18, June 8, 1992, pp. 1-7; New York Times, September 11, 1992, p. A-6; Los Angeles Times, January 18, 1993, p. A-1, March 17, 1992, p. A-1.

[195] Washington Post, November 17, 1992, p. A-1; Wall Street Journal, May 11. 193, p. 14.

[196] Washington Times, November 15, 1991, p. F-4; Washington Post, February 7, 1992, p. A-18, February 15, 1992, p. A-29; AP PM Cycle, February 6, 1992; "Iran's Nuclear Weapons Program," Mednews, Vol.

5,17/18, June 8, 1992, pp. 1-7.

[197] Patrick Clawson, Iran's Challenge to the West, How, When, and Why, Washington, The Washington Institute Policy Papers, Number Thirty Three, 1993, pp. 60-61; Financial Times, February 6, 1992; Washington Post, February 15, 1992, pp. A-29-A-30, November 17, 1992, p. A-30; Los Angeles Times, March 17, 1992, p. 1; AP, AM Cycle, February 12, 1992; Agence France Presse, February 12, 1992. Christian Science Monitor, February 18, 1993, p. 7; Wall Street Journal, May 11, 1993, p. A-14.

[198] Although the possibility is a real one. Financial Times, January 30, 1992, p. 4; Agence France Presse, January 26, 1992; Sunday Times, January 26, 1992; Der Spiegel, July 20, 1992, p. 117; Patrick Clawson, Iran's Challenge to the West, How, When, and Why, Washington, The Washington Institute Policy Papers, Number Thirty Three, 1993, pp. 63-65.

[199] Washington Post, November 17, 1992, p. A-30. Wall Street Journal, May 11, 1993, p. A-14; Christian Science Monitor, February 18, 1993, p. 7.

[200] The major uncertainty in such matters is whether Iran not has a significant centrifuge effort in a secret or underground locations. A few experts feel there is some risk that Iran might also have a secret reactor to produce Plutonium, but this seems unlikely. Washington Post, November 20, 1993, p. A-13.

[201] Los Angeles Times, March 17, 1992, p. 1.

[202] New York Times, November 30, 1992, pp. A-1 and A-6.

[203] The technical content of this discussion is adapted in part from the author's discussion of the technical aspects of such weapons in After the Storm: The Changing Military Balance in the Middle East, Boulder, Westview, 1993; working material on biological weapons prepared for the United Nations, and from Office of Technology Assessment, Proliferation of Weapons of Mass Destruction: Assessing the Risks, United States Congress OTA-ISC-559, Washington, D.C., August, 1993; Kenneth R. Timmerman, Weapons of Mass Destruction: The Cases of Iran, Syria, and Libya, Simon Wiesenthal Center, Los Angeles, August, 1992; Dr. Robert A, Nagler, Ballistic Missile Proliferation: An Emerging Threat; Systems Planning Corporation, Arlington, 1992; and translations of unclassified documents on proliferation by the Russian Foreign Intelligence Bureau provide to the author by the staff of the Government Operations Committee of the U.S. Senate.

[204] Estimates differ sharply over the prisoner of war issue. Iraq seems to have over 15,000 Iranian POWs and Iran seems to hold over 30,000 Iraqis.

[205] New York Times, March 22, 1992, p. A-9, April 10, 1992, p. A-3; Washington Post, April 10, 1992, p. A-46, April 16, 1992, p. 40.