

Weapons of Mass Destruction:

The cases of Iran, Syria, and Libya

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Executive Summary

The proliferation of weapons of mass destruction in the Middle East has become a major concern to Western nations, and is likely to become *the* security problem of the 1990s.

Iraq's Saddam Hussein showed that a determined Third World dictator was capable of assembling a potent arsenal of strategic weapons, often with the help of Western firms and the complicity of Western governments, and of using them against neighboring countries and against his own people. Now other countries in the region are attempting to build similar arsenals. They are transforming civilian chemical plants into poison gas factories, building ballistic missile delivery systems, and investing massive amounts of money to develop an atomic bomb. Recent reports suggest that they may get a head-start, either by hiring former Soviet nuclear scientists, or by outright purchases of nuclear weapons from the Former Soviet Union through unscrupulous middlemen.

This report focuses on the efforts of three countries to acquire new arsenals of unconventional weapons, and to build a broad-based military-industrial manufacturing base to support them. While their strategic weapons programs are at different stages of development, Iran, Syria and Libya have all acquired a significant chemical weapons capability. All share an iron determination to "go nuclear" before the end of the decade, and to manufacture ballistic missiles capable of carrying nuclear or chemical warheads. All consider international terrorism to be an appropriate foreign policy tool for "weak" nations, and have committed terrorist acts against the United States, its Western allies, and Israel. None of these regimes could be called a totally "rational" or "predictable" state. All three rely on repression to stay in power.

The prospect of weapons of mass destruction falling into the hands of "rogue" regimes poses major challenges to Western governments. This report presents dramatic

new evidence of the strategic weapons programs in Iran, Syria, and Libya, and reveals for the first time the extent of foreign assistance these states have received.

The age of proliferation is upon us. It is not for the distant future; it is not even for the year 2000. It is now.

I. The Proliferation Maze

The Gates Testimony

CIA Director Robert M. Gates was unequivocal when he appeared before the Senate Governmental Affairs Committee in January 1992.

"Today," he told the Senators, "over 20 countries have, are suspected of having, or are developing nuclear, biological, or chemical weapons and the means to deliver them."¹

Gates echoed earlier warnings from Defense Secretary Dick Cheney, who told an audience in Bonn, Germany on Jan. 13 that 15 to 20 developing nations would acquire ballistic missiles "over the course of the next several years," while "as many as half of those nations with ballistic missiles may, in fact, possess nuclear weapons by the end of the century."²

When Gates ran down the list of potential proliferation threats, it sounded like a litany of Middle East troublemakers. Top on the list, of course, was Iraq, whose large arsenal of unconventional weapons has not been completely destroyed. Then came Iran, Syria, Libya, and Algeria, and the countries of Southwest Asia, India and Pakistan. North Korea occupied a category all by itself, since it is believed to be on the verge of "going nuclear" this year.

The threat of unpredictable, radical regimes acquiring weapons of mass destruction is so imminent, Gates argued, that the US intelligence community must reorient its collection priorities. In late 1991, the CIA set up a Nonproliferation Center staffed with over one hundred officers from several agencies, "to better formulate and coordinate intelligence actions" in support of government policy.

Unfortunately, as this report will show, this very welcome change in US non-proliferation policy may have come too late. Ever wary of potential embargoes by supplying governments, radical Third World regimes have learned a vital lesson from Iraq: to build their own. Iran, Syria, and Libya are all moving to establish their own military-industrial base so they can indigenously manufacture ballistic missiles, chemical weapons, and nuclear warheads. Once they have accomplished this task there is little that Western powers can do to stop them, short of war.

Ironically, they have been aided in many cases by Western companies, ever eager to wrest lucrative export markets from their competitors. Because of the potential "dual-use" of much military manufacturing equipment, these companies frequently succeed in convincing their national export control authorities to approve such sales as legitimate civilian contracts. For instance, the same technologies used to manufacture a ballistic missile - whose sale is prohibited by international convention - are also needed to make a civilian satellite launch vehicle, which is allowed. Similarly, chemicals used to make nerve gas can also be used in food processing or pesticides, or to make plastics or ink. The pharmaceuticals industry may be the most difficult to control, since the same manufacturing plants that turn out animal vaccines and antibiotics can also be used, with little or no alteration, to produce deadly biological warfare agents. Large computers present similar problems, since they can be directly applied to solve a wide range of military problems, from artificial modeling of nuclear explosions to the plotting of ballistic missile trajectories.

Even when the export control regimes succeed in blocking a potentially dangerous sale, nations determined to develop nuclear weapons or ballistic missiles can now turn to a host of new supplying nations in the Third World, who are eager to pick up the new business. After Germany, which topped the list as the world's greatest proliferating nation through most of the 1980s, the most significant exporter of nuclear technologies today is China. State-run Chinese companies have helped fuel nuclear weapons programs in Iran,

Iraq, Syria, Libya, Algeria, and North Korea, in addition to providing these countries with ballistic missiles and vital production machinery.

But China is not alone among the new suppliers. Singapore has become a significant exporter of computers, North Korea can supply most ballistic missile production gear, while Brazil, Argentina, and Pakistan have already exported uranium enrichment technologies.

Added to this is a new threat generated by the disintegration of the Former Soviet Union (FSU). With no state employer to guarantee their jobs, some Soviet nuclear weapons scientists have already left their country, attracted by the fabulous paychecks offered them by countries such as Iran, Iraq, and Libya. However, as CIA Director Gates pointed out, "scientists need not leave at all to pass on specifications or advice to agents of another country." Particularly dangerous in this regard was Syria, he said, which had forged a very close intelligence relationship with the former Soviet regime over more than two decades. (Syrian agents are now known to be operating clandestine money-laundering rings in Western Europe on behalf of the former KGB). The expertise provided by the Soviet nuclear scientists could help "kickstart" the nuclear weapons programs of any of these countries, and must be factored into any revised estimate of how close they have come to acquiring a nuclear weapon.

But the leakage of Soviet nuclear weapons secrets and scientists is not all. There may be persistent rumors that military officers in the FSU, working in conjunction with mafia-like organizations, may have stolen tactical nuclear weapons from military bases in Kazakhstan and Turkmenistan, and offered them for direct sale to Middle Eastern regimes. If true, this would catapult countries like Iran or Libya into immediate nuclear status, radically altering the strategic balance in the region, and indeed, in the world.

The Lessons from Iraq

The gradual unmasking of Iraq's clandestine nuclear weapons program by the UN Special Commission since April 1991 has demonstrated the dangerous and illusory nature of the north-south nuclear "bargain" that was formalized in the Treaty on the Non-Proliferation of Nuclear Weapons (NPT) in 1968.

Under the NPT regime, developing nations of the south would be eligible to receive nuclear technologies from the north in exchange for a promise to "give up" their ambitions to become nuclear weapons states. This north-south nuclear bargain, formalized by the adherence of developing countries to the NPT and the elaboration of safeguards agreements with the International Atomic Energy Agency (IAEA) in Vienna, opened the door to extensive nuclear trade and the development of an international nuclear exporting industry. Because of the exorbitant sums of money at stake³, the nuclear industry soon became one of the most formidable lobbying groups in the world. Their interests almost exclusively tended toward the liberalization of export control regimes. Industry lobbyists consistently argued that the nuclear research programs underway in developing countries, including Iraq, should be accorded a "presumption of innocence" unless there was specific and detailed proof to the contrary.

Iraq was one of the first states to sign the NPT and to establish a safeguards agreement with the IAEA, thus opening the door for extensive nuclear purchases from the Soviet block and the West. Every six months, teams of IAEA inspectors would visit Iraq's Soviet, French, and Italian-built nuclear research plants at Thuwaitha. Every six months they reported they had found "no evidence" that Iraq was diverting imported technologies to a nuclear weapons program.⁴ For the nuclear exporters, it meant a huge market.

Now we know that all this optimism was ill-founded. In fact, the IAEA teams were never allowed (or never asked) to inspect the entire Atomic Research Center at Thuwaitha, which was one of the hubs of Iraq's nuclear weapons program. As it turned out, Iraq had been conducting nuclear weapons research right under the noses of the

IAEA "watchdogs," apparently unconcerned that their clandestine efforts would be discovered. After all, the IAEA had *never* in its history accused any nation of breaking the nuclear pact. Besides, Iraq had too many friends among the major nuclear suppliers.⁵

During the 1980s, Iraq built an entire clandestine uranium cycle, from mining, processing, to enrichment, with no fewer than seven totally dedicated industrial facilities. Three additional plants were engaged in nuclear weapons design and testing, while another twenty factories were manufacturing parts for uranium enrichment calutrons and centrifuges. None of these plants was ever subject to IAEA monitoring before June 1991 - and even this would never have occurred if it hadn't been for the Gulf war. Despite its long experience in Iraq, the IAEA had never suspected these plants existed.

Iraq has shown that any nation that is determined to skirt international proliferation controls can do so with a little effort and skill. The north-south "nuclear bargain" was in fact crafted to shelter the export sales of the nuclear industry, and not to prevent proliferation. The same argument (ie, that no concrete evidence of a weapons program has yet been found) is being used by the proponents of nuclear exports today to justify continued sales to other countries of proliferation concern, including Iran, Syria, Libya, and Algeria. This is one lesson that ought to have been learned for good from the Iraqi experience. Such does not appear to be the case.

Second, throughout the fifteen years of Iraq's nuclear buildup, the intelligence community never focused clearly or in any consistent way on the problems of proliferation. CIA Director Gates appears to be committed to changing this. However, even when the community *has* focused on proliferation, the Bush Administration has refused to give it the political support necessary to have any practical effect. The most egregious case of this has been Administration policy toward China, which has consistently been rewarded with trade benefits and the liberalization of export controls, despite its proven track record as a purveyor of nuclear and ballistic missile technologies. The failure to press West Germany for its poison gas and nuclear technology sales to Iraq

(and to other countries of proliferation concern, such as India, Pakistan, and North Korea) is another example.

"The biggest problem facing nuclear export controls today," writes Paul Leventhal, who heads the Nuclear Control Institute in Washington, "is not a control list that is too short, but a nonproliferation regime that is too long on secrecy and too short on political will. Bluntly stated, current US practice is to abstain from enforcing nuclear export controls whenever competing interests are deemed to take precedence - which is almost always."⁶

Finally, Iraq has shown that Third World nations are capable of serious scientific and technological accomplishments, which often get underrated in the West. When driven by a determined dictator, those accomplishments are most often directed toward military ends. In the future, we should be far more prudent in dealing with dictators, who simply do not obey the same logic as we do in our Western democracies. Nations such as Iran, Syria, and Libya have no need for nuclear power, and little reason to be conducting nuclear research. None aspires to manufacture civilian space launch vehicles. And yet, all three continue to purchase technologies from the West, the Former Soviet Union, and China, ostensibly for these purposes.

II. Iran

Economic woes

Iran emerged from its eight-year war with Iraq a battered nation. The army had been thoroughly routed and its equipment largely destroyed, thanks in part to the extensive use by Iraq of chemical weapons and ballistic missiles during the final campaigns of the war. The economy was in tatters, with unemployment running 25% and rising; industrial production was less than half the level it had reached in the late 1970s under the shah. Infrastructure losses caused by the conflict have been estimated at \$200 billion, and could be significantly higher.

Compounding Iran's difficulties was its diplomatic isolation, caused by a flagrant support for international terrorism and hostage-taking. Western governments were not eager to invest in Iran, banks were not providing loans; Iran was considered a country inimical to Western interests. This was further aggravated by the "death sentence" pronounced by Ayatollah Khomeini on February 14, 1989 against British writer Salman Rushdie, because of the allegedly blasphemous tone of his novel, *The Satanic Verses*. One week after Khomeini's call to Muslims throughout the world to assassinate Rushdie, the European Community decided to recall its ambassadors from Tehran. In retaliation, the Iranian Majlis voted on Feb. 28 to sever diplomatic ties with Britain. Although most EC ambassadors returned gradually over the following months, relations between Britain and Iran remained suspended until Sept. 27, 1990. Trade slumped dramatically between Iran and Western Europe during this period, only picking up in 1990.

The death of Ayatollah Khomeini in June 1989 momentarily raised expectations that Iran might embark on a more moderate course, but these hopes were frustrated by the continuation of the hostage crisis in Lebanon. The event that most influenced Western

investors was the announcement in the early autumn of a new Five-Year Plan, to cover the 1990-1994 period. The new plan was adopted by the Majlis on Jan. 31, 1990, and for the first time since the proclamation of the Islamic Republic authorized the government to borrow money on international markets to finance reconstruction and development projects. Of the approved ceiling of \$27.4 billion over the five-year period, \$7.5 billion of the borrowed funds was earmarked for "strategic industries."⁷ Iran had come late to the unconventional weapons game, but they were about to arrive - in a big way.

Western banks gradually began to open their coffers. The first were a pair of French banks, the Société Generale and the Banque Nationale de Paris, which offered a total of \$4.6 billion to finance reconstruction projects undertaken by French companies in Iran. They were soon followed by major loans from Germany and Italy. As of May 1992, a broad range of industrial and infrastructure projects were underway, including new oil refineries, petrochemicals plants, fertilizer plants, aluminum smelters, and steel plants. Many of these plants will provide raw materials and finished products for Iran's military industries.

The Plan also called for \$10 billion in hard currency to be allocated to foreign arms purchases through 1994, according to a statement by the Minister of Defense and Armed Forces Logistics, Ali Akbar Torkan⁸. The real amount spent on militarization will undoubtedly be much higher, once barter agreements and other forms of counter-trade are taken into account. (Most of Iran's arms purchases from Third World nations, such as Brazil, China, North Korea, have been financed in this manner, as have all but the most recent purchases from the Soviet Union.).

Beyond this, Iran is spending billions of dollars importing high-technology manufacturing equipment to develop a very large military-industrial base. Much of that equipment is coming from the West.

Conventional Arms buildup

Despite Iran's shaky economic situation, it embarked on a massive arms buildup less than one year after the end of the war with Iraq. Frustrated after years of unsuccessful attempts to purchase spare parts for its American-built fighter planes because of the Western arms embargo, Iran finally turned to the Soviet Union on a major scale. The first acknowledged arms purchase from Moscow, worth \$1.9 billion, was signed by Ali Akbar Hashemi-Rafsanjani during a trip to the USSR in June 1989. It covered the delivery to Iran of 48 MiG-29 fighters and 100 T-72 tanks, as well as the training of Iranian pilots and crews. Iran paid for the arms with natural gas delivered through the reopened IGAT II pipeline traversing Azerbaijan⁹.

This was followed by the largest single arms export deal ever concluded by the Soviet Union, a \$6 billion package signed in Moscow in July 1991 between the head of the Iranian Air Force, General Mansur Sattari, and his Soviet counterpart, Lt. Gen. Yevgeny Shaposhnikov. Russian officials involved in the negotiations said in interviews that the deal covered the delivery of 100 MiG-29 fighters, 48 MiG-31 high altitude interceptors, a squadron of Sukhoi-24 long range strike aircraft, two Ilyushin Il-76 aircraft fitted out with airborne early warning planes, and the construction of a MiG-29 assembly plant in Iran.¹⁰ Other reports mention deliveries of SA-5 air defense missile batteries, large numbers of 122 mm and 130 mm guns¹¹, and a factory to assemble T-72 tanks.¹²

It was subsequently revealed that Iran had also taken delivery in 1991 of three Kilo-class attack submarines from the former Soviet navy, and was training 600 to 700 naval cadets at the Bolderaja naval base near Riga, Latvia. The Latvian government demanded that Moscow halt the training course.¹³

Although Marshal Shaposhnikov, who now serves as CIS Defense Minister, told reporters in New York in February 1992 that Russia would limit its arms deliveries to Iran¹⁴, he was contradicted almost immediately by other officials, who stated that Russia

needed to expand cash and carry arms deliveries in order to finance long-term industrial conversion.¹⁵ Among them was Russian president Boris Yeltsin, who in a Feb. 29 statement carried by Russian radio authorized the Russian federal air force to sell to foreign hard-currency buyers up to 1600 combat aircraft withdrawn from its own inventory.¹⁶

Part of this mammoth arms protocol with Russia involved integrating the 91 Iraqi warplanes flown for safekeeping to Iran during the Gulf conflict by Iraqi pilots.¹⁷ Those aircraft have already been repainted in Iranian Air Force colors, and have been handed over to the newly formed air wing of Iran's Revolutionary Guards, or Pasdaran, which is being trained and maintained by former Soviet military experts

The new Soviet deliveries, when added to the Iraqi planes seized by Iran, will restore the Islamic Republic of Iran Air Force (IRIAF) to its Imperial, pre-Revolutionary status. In a scant three years, Iran has completely renewed its ailing air force. It can now muster 300 front-line Soviet fighters and fighter-bombers, backed up by an additional 100 Chinese F6 and F7 fighters (the equivalent of the MiG 19 and MiG 21) for trainer and operational conversion. In addition to these new warplanes, Iran has another 200 to 300 US-built F-4, F-5, and F-14 fighters, many of which have been put in long-term storage in air-tight cocoons. Iran has reportedly succeeded in reverse-engineering essential spare parts for these aircraft with the help of Chinese technicians, and could conceivably get many of them flying again¹⁸. In the event of a future conflict, Iran could deploy several squadrons of US-built aircraft with NATO standard identification beacons (IFF), for purposes of deception.

Ironically, preventing the switch from US to Soviet standard aircraft was repeatedly cited by US officials as early as 1983 as the main reason for "keeping the bed warm" in Iran through a modest level of clandestine arms sales to Tehran. While the logic of the Cold War is a thing of the past, the threat posed by a reinvigorated Iranian air force is as real as ever to the Islamic Republic's immediate neighbors: Kuwait, Saudi Arabia, and

Iraq. Coupled to Iran's vigorous program to develop a nuclear weapon and to produce medium-range ballistic missiles, the return of a modern, well-equipped Iranian Air Force will effectively restore Iran to the regional superpower status it enjoyed under the Shah.

The Weapons Industry

To increase their independence from fickle arms suppliers and a Western embargo, Iranian leaders decided in the mid-1980s to relaunch indigenous weapons production, largely neglected - and even maligned - since the ouster of the Shah in 1979. Current production include everything from military electronics, gunpowder, munitions and helicopters, to ballistic missiles and chemical weapons.

In the final days of the war with Iraq, Iranian leaders began praising their defense industries in glowing terms, calling them "the self-sufficiency Jihad, " or again, the "reconstruction Jihad." In an interview with Iranian television on March 10, 1988, Revolutionary Guards Minister Mohsen Rafiq-Doust tried to strike a popular chord when he explained why the Pasdaran had assumed responsibility for much of the Shah's weapons industry. "The bullets we manufacture are more effective than others," he told Iranian viewers, "because they are coupled with the grace of God."¹⁹

Such statements constituted a dramatic reversal of one of the most deep-seated propaganda standards of the Islamic Revolution: the rejection of Western culture and technology. In the months following the arrival of Ayatollah Khomeini to power in February 1979, tens of billions of dollars worth of arms contracts and licensing agreements with Western companies were abruptly canceled overnight. The arms industry built up by the Shah at such great expense was derided as a symbol of waste, greed, and personal ambition, while foreign investment in Islamic Iran was seen as the expression of neocolonialism. Western technology was decried as a corrupting influence.

But the long war with Iraq bred changes out of a necessity; and in less than a decade the "sins" of the monarchy were transformed into revolutionary virtues. "When technology is in the hands of a pious human being," Prime Minister Mir Hossein Mussavi told an aerodynamics seminar which opened in Tehran on April 16, 1988, "it is a means for achieving lofty Islamic ideals, but when it is controlled by satanic forces it becomes a destructive instrument of colonialism."²⁰

In the weeks that followed the beginning of the 1988 "War of the Cities," during which Iraq shot off more than 184 upgraded SCUD-B missiles against Tehran and other population centers, Iranian leaders claimed to have launched "1,000 research projects" in the field of armaments.²¹ In part, the aim was to boost public morale, undermined by the incessant Iraqi attacks. But all the claims were not mere hype.

News of Iran's indigenous arms industry has been trickling out of the country for several years. As early as September 1982, Iran claimed to have begun locally overhauling F-4 engines (they had previously been sent to Bedek Aviation in Israel, an arrangement left over from the Shah). They also performed repairs on American-built helicopters, and organized an exhibition of local military production in Tehran.²² In 1984, Iranian military officials announced they could produce spare parts for aircraft, tanks, and naval vessels, and were approaching self-sufficiency in munitions production.²³

"The Iranians have been bringing technicians back into the country from the United States and France," said one Western source with personal knowledge of the Iranian weapons industry. "Now they are capable of rebuilding aircraft engines, and even of manufacturing some air-to-air missiles."²⁴ Revolutionary Guards Minister Rafiq-Doust announced that Iran expected to save "more than \$1 billion in foreign currency" in 1988 by locally producing ammunition, mortars and other arms.²⁵ Forced by the war to develop a home-grown weapons industry, Iran could well become the third industrial power in the Middle East, after Israel and Egypt.

The list of Iranian weapons projects in the works or actually in production may fall short of the high-tech fantasies of the Shah, but it shows a serious, sustained effort on the part of the Islamic Republic to build a military industrial base. Like South Africa, Iran reacted to the a Western arms embargo by establishing its own arms industry "from the ground to the sky." Raw material mining has been expanded in recent years, and new steel complexes have been built in proximity to major military plants, to ensure a steady flow of raw materials for weapons production.

Here is just a partial list of the weapons systems Iran now claims to produce:

- reconnaissance cameras
- observation systems
- laser range finders
- night sights
- artillery fire control systems
- HAWK missile spare parts
- armored personnel carriers
- gunpowder
- mortars (various calibers)
- munitions (20, 23, 35, 120, 155 mm)
- gravity bombs
- pilotless aircraft
- light trainer aircraft
- tactical missiles
- surface-to-surface missiles
- long range artillery rockets
- spare parts for F-4, F-5, and F-14
- helicopters, and helicopter spares
- tugboats

- speedboats
- gas masks
- rifles & handguns²⁶

The scope of projects undertaken by the Islamic Revolution Guard's Corps (IRGC) and the Regular Armed Forces would have been impossible without the industrial infrastructure purchased in the West by the Shah. As we shall see below, this industrial base also provided the opportunity for Iran to become a major producer - and eventually, an exporter - of ballistic missiles.

Military Production under the Shah.

Military production in Iran grew concomitantly with the Shah's massive arms build-up in the late 1960s and 1970s. As Iran was purchasing state-of-the-art jet fighters, tanks, helicopters, and air defense systems, it was also concluding technology transfer agreements with its primary arms suppliers: the United States, Great Britain, and West Germany. Most of the technology agreements involved local assembly of Western equipment, or maintenance of the rapidly expanding Iranian inventory. There was little local production of spare parts, and no weapons design capability, although this was planned. So dependent on foreign assistance was the Iranian military-industrial complex under the Shah that a 1986 SIPRI study termed it "an enclave industry."²⁷

Although weapons production expanded during the 1970s, "most people employed in manufacturing worked in traditional, craft-type shops," the SIPRI study noted. "Capital goods used for weapon production, like iron and steel, machine tools, electronics and transportation equipment, were imported." It was the type of industry that simply collapsed once the foreign advisors walked out. This is no longer the case. As General Mansur Sattari, head of the Iranian Air Force, told one interviewer in 1990, "The dismissal of foreign experts from Iran was a divine blessing for us. We are now

witnessing the flowering of our experts' creativity and their efforts to get rid of global arrogance," a code-word for US influence.²⁸

The tradition of arms-making in Iran goes back to the mid-1920s, when Reza Shah set up the Parchin powder manufacture with German help, the oldest continuously operating munitions plant in the Middle East. Next, Reza Shah signed agreements with Czechoslovakia and Nazi Germany to begin local assembly of Mauser rifles, machine-guns, and anti-aircraft guns. By the start of WWII, Iranian plants were assembling British-designed Hawker Fury I and Hawker Hind aircraft as well.

When Russian troops stormed across the border into Iran in 1941, everything changed. The German and Czech weapons experts fled, in fear of their lives, and the fledgling aircraft assembly line ceased to function. The Parchin munitions plant was seized as war booty by Stalin and used exclusively to fuel the Red Army machine. After World War II, Iran's weapons industry fell into disrepair. Military production was only revived in the late 1960s, by Reza Shah's son, Mohammad Reza Pahlavi.

Under the umbrella of the Military Industries Organization (MIO), the Shah set up a host of joint ventures specializing in various branches of military production. One of the largest was Iran Aircraft Industries (IACI), established in 1970 with the American aerospace firm Northrop, to maintain and repair Iran's newly-purchased fleet of F-5 fighters. IACI facilities were operated under contract by Lockheed Aircraft Service Company and General Electric, but once the Iranian government bought out the Northrop share in 1975 it appeared on paper as a wholly-owned Iranian government company.

By the time of the Islamic Revolution, IACI was maintaining a fleet of 169 F-5s, as well as Iran's T-33A trainers, Lockheed P-3 Orion maritime surveillance aircraft, and a large fleet of C-130 transport planes. It operated maintenance facilities in Tehran, Isfahan, Busheir, Shiraz, and Tabriz. According to the SIPRI study mentioned above, 75% of IACI's 2,600 work force was Iranian, but "they were disproportionately represented in management and unskilled jobs." The heart of the IACI maintenance

operation was handled by 600 skilled workers from Pakistan, South Korea and the Philippines, and supervised by 50 US technicians.

The maintenance and support contracts were terminated within weeks of the Islamic Revolution. But following Iraq's invasion of Iran in September 1980, Iran's new leaders gradually realized it was a major asset they could not let go to waste.

The vast majority of the MIO factories had been ransacked by angry mobs during the early days of the Islamic revolution. Since co-production and development contracts had been canceled, the factories were closed; production machinery was trashed in the anti-Western orgy which gripped the country. Without the aid of Western technicians, the largely-unskilled Iranian work force was incapable of restarting military production. Indeed, it took a major reorganization effort led by President Abolhassan Bani Sadr in the spring of 1980 just to locate spare parts for the IRIAF, virtually grounded by the American pullout, despite the "mountains of spares" rotting in provincial warehouses.²⁹ And yet, the MIO plants provided the base on which the Iranian Revolutionaries would later build their massive military industry, which today also makes chemical weapons, ballistic missiles, and is working on the bomb.

The first plants to reopen their doors after the Revolution were the Parchin and Sultanabad munitions plants, since these relied the least on American technology. By 1982, assistance was forthcoming from West Germany (Rheinmetall, Fritz Werner, MBB), Great Britain (Royal Ordnance, ICI), Sweden, (Bofors, Nobel Chemie), Austria (Voest-Alpine), Italy (Snia Bpd, Oto Melara), and Switzerland (Oerlikon Bührle)³⁰.

By mid-1985, a score of contracts had been signed with European explosives manufacturers to set up new production facilities for various caliber munitions at Sultanabad, where the Pasdaran's Defense Industries Organization (DIO) had set up shop in the old administrative quarters of the MIO. Fritz Werner GmbH resumed its former role as a major source of machine-tools and services for several different munitions works, while a consortium of German companies that included H. Wohlenberg

KG built an artillery plant. Other contracts were signed with France to maintain the large gunpowder plant in Parchin, which some sources believe also manufactures CW agents, and with Les Forges de Zeebrugge/Herstal, of Belgium, to set up a manufacturing plant to build air-launched rockets³¹

A vast new munitions complex built in Isfahan by Bofors with the help of other European contractors first opened in 1987, company officials acknowledged in interviews. But because of repeated Iraqi bombardments it was officially inaugurated by President Hashemi-Rafsanjani on March 1, 1989.³² Bofors contracted for the deal with the Shah, but "suspended" deliveries once the Iran-Iraq war began because of a Swedish government embargo on sales to Iran or Iraq. In the end, day to day management of the Isfahan project was handed over to a Swedish intermediary, Karl-Erik Schmitz..³³

Without a doubt, Iran has emerged as a significant arms producer in the Middle East, as a direct result of the war with Iraq and the American and European arms embargo. A sustained effort has been made to anchor the fledgling armaments industry launched by the Shah in a broad-based industrial fabric, with a strong emphasis on local supplies of raw materials and independence from foreign suppliers.

Ballistic Missiles

Iran came late to unconventional weaponry, preferring to rely on faith and "human waves" of young conscripts through most of its eight-year war with Iraq, rather than embark on the costly development of ballistic missiles and chemical weapons. Besides, the Western arms embargo had rendered tanks and anti-aircraft missile batteries inoperable and had virtually grounded the Iranian air force. Iran's top priority in the early 1980s was the acquire spare parts and other supplies to keep its conventional forces in the war.

Iraq's intensive use of chemical weapons in 1983-84, and the launch of surface-to-surface missiles against Iranian border cities in March 1985, prompted Iran's leaders to

take a new look at unconventional weaponry. It also convinced them to turn increasingly to new, non-Western suppliers.

In late 1984, an emergency agreement was reached with Libya to purchase small quantities of SCUD-B missiles.³⁴ While Libya had been supplying Iran with Soviet-built tanks and other weapons since the early days of the war, this was the first time Iran was known to have purchased ballistic missiles. A meeting of the foreign ministers of Syria, Libya, and Iran in January 1985 led to additional SCUD deliveries from both Syria and Libya to Iran. Syrian missile technicians were immediately dispatched to Sardasht, on the outskirts of Dezful, where the Pasdaran Missile Brigade was headquartered, to train the Iranians in fueling and operating the SCUDs.³⁵ Between March and May 1985, Iran launched 14 Scud-Bs against Iraq.³⁶

The Soviet Union was aware of these sales and appears to have given its green light, US officials interviewed at the time believed, as a means of extending covert aide to Tehran³⁷. Indeed, one arms broker who presented documents detailing a \$1.2 billion arms deal between Syria and Iran that included the delivery of Scud-Bs in early 1986, said that Syria was merely trans-shipping weapons it had purchased on Iran's behalf from the USSR and from Poland. The Syrians were operating through a Palestinian intermediary named Hassan Zobaidi, who had moved to Damascus from Beirut following the 1982 war, the documents showed. Zobaidi's outfit, the International Trade and Commerce Establishment, was empowered by Iran to barter oil for the weapons, and sold promissory notes received from Indonesia, Malaysia, and the Philippines at deep discounts in order to raise the needed cash.³⁸

But Iran could never acquire large number of SCUDs in this manner, and even these modest deliveries could be cut off on a whim or for political considerations. So at the same time Iran was receiving its first SCUDs from Libya and Syria, Revolutionary Guards Minister Mohsen Rafiq-Doust was negotiating hard with China and North Korea,

to establish a more long-term relationship. Both countries were already selling Iran vast quantities of conventional weaponry.³⁹

Iran wanted to become self-sufficient in missile production, and was looking for partners. By mid-1985, it had found them.

The North Korean Connection

Like Iran, North Korea was a pariah state. This psychological affinity between the two undoubtedly helped convince the Iranians to throw in their lot with Pyongyang, which had run out of funds to pursue its missile programs. In this landmark 1985 accord, Iran agreed to finance North Korea's effort to reverse-engineer the SCUD-B, in exchange for missiles and production technology. Iran also offered to help out in the clandestine acquisition of critical technologies in the United States and West Europe.

The North Koreans had been working on the SCUD project since the early 1970s, when the Soviets refused to provide them with the SCUD-B. In 1976, they received a few missiles from Egypt and began taking them apart, but the program soon came to a halt for lack of money. According to W. Seth Carus and Joseph Bermudez, the DPRK "covertly obtained" Western and Japanese electronics gear for their missile programs. In addition, they used a grant from the United Nations Development Program (UNDP) to build a small semi-conductor plant in Pyongyang, which began production in April 1987.⁴⁰

The North Korean-Iranian connection surfaced in odd ways. Already in May 1984, for instance, a Soviet émigré, Yuri Geifman, was indicted in New York for unlicensed exports of sophisticated electronic components to North Korea, for use in ballistic missile guidance systems. In October of the same year, an Iranian businessman based in West Germany, Babeck Seroush, was indicted on similar charges, following an investigation by the US Customs Service. The two were said to be part of the same smuggling ring. What North Korea could not obtain through the technobandits it simply imported from China, including the entire liquid fuel rocket engine and key guidance components.

In January 1987, the first missile prototype was test-launched in North Korea. In June, the two countries signed a \$500 million follow-on agreement, that covered the delivery of 90-100 production SCUDs to Iran. Deliveries began in late 1987 and were completed by March 1988. Iran deployed its new missiles immediately, firing 77 of them against Iraq during the "War of the Cities" that began on Feb. 29, 1988.

Part of the follow-on agreement covered North Korean assistance in setting up ballistic missile production facilities in Iran for the SCUD-B and for a longer-range version, the SCUD-C. According to one report, as many as 100 separate plants were involved in missile production in Iran as of 1988, employing several thousand people.⁴¹

Iran's largest ballistic missile plant was built by the North Koreans near the industrial city of Isfahan in central Iran, where many other large weapons were located, including a gunpowder plant built by the Swedish firm, Bofors. Production of the SCUD-B began in 1988 on a limited scale.

Isfahan was a natural choice for strategic weapons manufacture. In addition to boasting a skilled work force, it was close to iron mines, mineral resources refineries, and housed a gigantic Soviet-built steel plant. So great were the needs of the Isfahan weapons complex that the Iranian government asked Danielli spa of Italy to expand the Soviet plant in 1989, and decided to build a second, even larger steel plant 70 kilometers away, to feed the weapons industry. The \$4.7 billion Mobarakeh steel complex is being built by a consortium of Italian, Japanese, and Swiss companies, including Italmimpianti, Kobe Steel, Marubeni, Nippon, Kawasaki Steel Corp, Showa Denko, and Balmin Kommerz, as a "development" project..⁴²

Other plants were built beyond the range of Iraqi aircraft and missiles. Iranian exiles say that the Semnan complex, located 175 km east of Tehran, was built in 1985 with Chinese help to manufacture a 40-kilometer range artillery rocket, called the "*Oghab*" (Eagle), believed to be based on a Chinese Type-83 design. The *Oghab* is fired from a Mercedes-Benz LA911B truck (three rockets per launcher). During the 1988 War

of the Cities, 243 *Oghabs* slammed into Iraqi border cities, prompting then Iranian Defense Minister Mohamad Hossein Jalali to comment on Iranian television that "80% of the missiles raining down on the Saddamists and sending them to hell are manufactured by our defense industries."⁴³ Local missile production cost "one-third what we would spend if purchasing from abroad," Jalali said.

Further east along the Tehran-Mashad railway, the Chinese and North Koreans appear to have collaborated in building another large military complex at Shahroud, which includes a tank and howitzer munitions plant and a ballistic missile test range. According to sources inside Iran, a high volume of truck traffic between the Shahroud complex and Pasdaran Silkworm bases sites near Bandar Abbas in early 1988, suggested that Silkworm production may have begun at this site, under a Chinese license. A statement prepared by the Opposition People's Mujahidin Organization of Iran on February 2, 1991 alleged that the Pasdaran were using test equipment "bought from the German MBB Corporation" to extend the range of the Silkworm.

A third missile site was built 350 km to the south at Tabas, along the Mashad-Isfahan road, to monitor missile tests from the Shahroud range. All ballistic missile programs in Iran are run by the Islamic Republic Guards Corps (IRGC), the radical arm of the Iranian revolution, and come under the control of Pasdaran's military commander, Mohsen Rezai.

Rezai was in Pyongyang in October 1989, where he twice met with North Korean leader, Kim Il Sung. He told the *Iran Times* upon his return to Tehran that he had just "signed an agreement covering exchange of training and war experiences, transfer of military technology and weapons, and scientific cooperation."⁴⁴

On Nov. 29, 1990, a senior North Korean military delegation paid a return visit to Tehran, where they finalized new missile projects with Rezai and with Ahmed Khomeini, the Ayatollah's son. Within weeks, scores of North Korean technicians and military

advisors arrived in Iran. According to one report, they "went to work turning an Iranian missile maintenance facility in eastern Iran into a missile production site."⁴⁵

On Jan. 29, 1991, an Iranian defense ministry spokesman announced that Iran was launching mass production of a "powerful long-range surface-to-surface missile," that would have "a high destructive power."⁴⁶ This was the fruit of all the back and forth discussions, and is understood by US intelligence analysts to mean involve a North Korean upgrade of the venerable SCUD-B, alternately known as the SCUD-C or the SCUD-PIP (product improvement program). In subsequent months, US intelligence agencies tracked several shipments of SCUD-Cs and manufacturing equipment as they were flown from North Korea to an Iranian military base on board Iran Air 747 cargo planes.⁴⁷ In mid-May 1991, US intelligence officials said that Iran had test-fired a new ballistic missile, which they now openly identified as the SCUD-C. The missile was fired from a mobile launcher near the holy city of Qom, and flew eastward 500 kilometers, landing within the Salt Desert proving range to the south of Shahroud.

In October, Iran reportedly agreed to purchase 20 SCUD-Cs from North Korea, and was so pleased with the new missile that it ordered 150 additional missiles one month later.⁴⁸ One US intelligence analyst interviewed said that he believed the SCUD-C was "well beyond" the technological capability of the Iranians alone. "They need constant help from North Korean technicians" to launch series production.

If deployed near Iran's borders, the SCUD-C would give Iran the capability of launching a CW and, potentially, a nuclear warhead deep into Turmenistan, Afghanistan and Pakistan, or into southern Ukraine and central Turkey. To the south, Iranian missiles would be capable of annihilating US forces prepositioned at the Dhahran air base in Saudi Arabia, as well as the headquarters of the US Central Command in Bahrain. However, Iran would need to develop a much longer-range successor, capable of reaching distances of 1100 km and more, if it wanted to hit Israel.

Congressional sources with access to intelligence information say that Iran is financing the development of a new North Korean missile, the *No-Dong 1*, expected to have a range of approximately 1,000 km. Little is known as of yet about this missile, and intelligence experts continue to dispute its most basic characteristics. However, in the words of one analyst at the Defense Technology Security Agency, North Korea will need "a substantial input of foreign technology" in order to build the new missile. Likely sources are China, and Germany.

The China card

It is often difficult to separate missile plants and projects that are being built with North Korean assistance, from others which are getting help from the Chinese. As one US intelligence official remarked privately, China and North Korea were "as close as lips and teeth" when it came to arms sales, standing in for one another when the need arose. This confusion continues today, as China tries to get itself out of political hot water with the United States because of its continued sales and deliveries of ballistic missiles to the Middle East.

However, there does appear to have been a separation of labor in Iran, with North Korea selling liquid-fuel missiles and related production equipment, and China supplying solid-fuel rockets and advanced missiles, which tended to be more sophisticated, more reliable, and more accurate. Like Iraq, Iran wanted to master both technologies, as an added guarantee of maintaining independent long-term missile supplies.

China became Iran's single largest arms supplier by 1982. In July 1985, the arms relationship was given a dramatic boost, when Majlis speaker Hashemi-Rafsanjani concluded a \$1.6 billion weapons deal during his first official visit to Beijing. Rafsanjani followed on the heels of a Revolutionary Guards military buying mission, which had returned to Tehran from Beijing in June. In addition to Silkworm missiles and F-7M fighters, which were delivered the next year, the Pasdaran were eager for help on their

military manufacturing efforts. The Chinese agreed to build several new weapons factories in Iran for the production of Chinese missiles and artillery rockets, starting with the *Oghab* (The *Oghab* was first spotted on the battlefield during the Basra offensives in December 1986⁴⁹). A more accurate version of the *Oghab* called *Fajr 3*, went into production in late 1989.

As part of the Air Force contract, which was formalized in a separate protocol negotiated by a Hong Kong intermediary, Aircraft Technology Ltd., China supplied 50 F-7M fighters upgraded with Western avionics, which were assembled in 1986-1987 in the revived factories of the old Iran Aircraft Industries. Two volumes of contractual documents, bound in light blue, were made available by intermediaries in Paris. They reveal a totally unknown aspect of this deal: the supply of "Chinese copies" of American and French air-to-air missiles and weapons systems.

As part of their offer, the Chinese provided Iran with 2,500 PL2 and PL2A missiles, which the documents describe as "similar to" the American "Sidewinder" and improved Sidewinder air-to-air missile. As of early 1987, the Chinese began delivering the far more sophisticated PL7, a locally-made version of the Matra Magic R-550, an advanced, long-range air-to-air missile that had just entered service with the French Air Force. The PL7 features a more powerful motor than the PL2 family that allows it to hit quickly-maneuvering targets at distances up to 10,000 meters. The Chinese chose to use an intermediary for this deal because of the sensitive nature of the transfer, which presumably would have been prohibited if either the French or the US government had known about it.⁵⁰

China also agreed at this time to help Iran to manufacture its first short-range ballistic missile using solid fuel technology, which it dubbed the *Nazeat* (also known as the *Iran-130*, because of its 130 km range). The first production missiles came off the Isfahan assembly line in early 1988, and were fired against the Iraqi city of Al-Amarah on March 19, 1988.⁵¹

One essential ingredient for solid-fuel missiles is a special chemical, ammonium perchlorate (AP), used as an oxidizer in the fuel. Only a handful of companies in the world make AP; two of them are located in the United States. On August 26, 1988, a large shipment AP was seized by U.S. Customs in Houston, Texas, bound for Iran. In fact, Customs officials said in interviews at the time that they had nearly *missed* an earlier shipment, which they only traced once it had left the United States. In February 1988, they tipped off their Customs colleagues in Holland, who found 286,000 pounds of the chemical on board an Iranian vessel then docking in Rotterdam. “That's enough AP to produce fuel for hundreds of medium-range missiles,” Customs sources said. Court documents show that the Iranians purchased the chemical through a web of intermediaries in West Germany and Switzerland. If nothing else, the case shows the extravagant scope of Iran's ballistic missile programs.⁵²

Undaunted by the Customs seizures, Iran again turned to China in 1989 and began negotiations to set up a new manufacturing line at the Isfahan missile works, to assemble China's latest missile, the short-range M-11. The M-11 had been conceived solely for the export market, since China had no operational requirement for such a short-range missile. The M-11 was designed as a solid-fuel replacement of the SCUD-B, with a similar range (280 km), and could be fired from standard SCUD-B launch vehicles.⁵³ But since it used solid-fuel, it was quicker and easier to deploy than the liquid-fuel SCUDs, which sometimes sent missile crews to hospital with terrible burns from the highly-toxic fuel.

Parallel to the M-11, China had developed a slightly longer solid-fuel missile, the M-9, capable of hitting targets at ranges of 560 kilometers. Iran expressed an interest in assembling both missiles, and negotiating teams traveled back and forth from Tehran and Beijing throughout 1989. The deal was finally sealed on January 21, 1990, when China dispatched a high-level military delegation to Tehran, led by the Deputy Director of the all-important Commission on Science, Technology and Industry for National Defense, General Jiang Xua. General Jiang also signed a ten-year nuclear cooperation protocol.

Since the last major military agreement between China and Iran, there had been changes in Tehran. On July 28, 1989 Hashemi-Rafsanjani won a landslide victory to become Iran's president, and one of his first acts was to put an end to years of years of infighting between the Revolutionary Guards and the American-trained regular Army. Ostensibly to "avoid duplication of effort," all weapons development, procurement, logistics and related functions were rolled into a single operation, headed by a new Minister of Defense and Arms Forces Logistics, Ali Akbar Torkan. Torkan's previous job had been as head of the Defense Industries Organization. Another carry-over from the DIO, Mohammad Reza Nematzadeh, was appointed as the new Industry Minister. Nematzadeh had been Director for Aviation Industries.

When Torkan met the Chinese in Jan. 1990, he wanted to formalize arrangements into a long-term military pact, that would guarantee Iran's supplies of critical weapons technologies for the next ten years. It was a monumental deal, and it covered the transfer of production technology for a wide variety of strategic systems. Included were the M-11 (Iranian designation: *Tondar-68*), and the longer-range M-9.⁵⁴

Chemical Weapons

Iraq's sudden, intense use of chemical weapons starting in 1983 appears to have taken the Iranians by surprise. As mentioned above, all their procurement efforts at this time were focused on obtaining spare parts and munitions for the large conventional arsenal recovered from the Shah. With its industrial infrastructure in disarray, Iran was not in a position to envision manufacturing chemical weapons. Its first reaction to the Iraqi attacks was entirely defensive: chemical warfare protection gear rocketed to the top of the procurement lists Iranian agents circulated in the United States, Europe, and Japan. Documents in the Mednews archives show that in one such deal under negotiation with a British supplier in April 1984, Iran sought to purchase 200,000 gas masks and 250,000 doses of atropine, a mustard gas antidote.

As time went on, however, and as the Iraqi chemical attacks persisted, Iran appears to have acquired small quantities of mustard gas, perhaps from Syria⁵⁵ Later, they started purchasing chemicals on the world market to manufacture mustard gas, nerve agents, and hydrogen cyanide. Iran also imported specialized production equipment.

Little has been published on Iran's chemical weapons industry. Iranian leaders appear to have been drawn to the chemical battlefield with reluctance, as can be seen by some of the public statements reproduced below. The following account draws on extensive interviews with officials in the United States, Britain, France, Germany, and Israel, and must be considered an interim report. The full story of Iran's chemical weapons program, and the Western help it received, is not yet known.

U.S. intelligence analysts were convinced as of late 1987 that Iran had become a chemical power, and had already acquired the capability of fitting a CW warhead onto the SCUD-B missiles they had received from Libya, Syria, and North Korea. Precursor chemicals had been shipped to Iran from the U.S. and West Germany, but at that time there were few controls to prevent them from getting through.

The first known export control case involving the shipment of chemical weapons precursors to Iran was initiated by the U.S. Customs Service in April 1988 - well after the deliveries had begun.

In 1985 and 1986, Iraq started accusing Iran of using chemical weapons on the battlefield, but these charges were generally dismissed as an Iraqi attempt to deflect the widespread international attention their own CW use had provoked. A UN team finally went to Iraq in April-May 1987 to investigate the charges, but found no conclusive evidence that Iran had gassed the Iraqi soldiers they were allowed to examine. On the contrary, they suspected that the Iraqis had been hit by their own mustard gas, blown back by changes in the wind. This has since generally been accepted as true.

The Alcolac case

In January 1987, a Baltimore, Maryland chemicals manufacturer, Alcolac International, was contacted by a German company wishing to purchase 15 tons of thiodiglycol, which can be easily converted into mustard gas. By the time the contract was finalized, later that month, the order was doubled to 30 tons. The German company, Colimex GmbH, turned out to be operating on behalf of Iran, but said that its real client was in Greece. In February and March 1987 the chemicals were shipped to a Greek company, Cy Savas Oikonomidis EE, which sent them on to Iran.

In June, Colimex came back and placed a follow-on order for 60 tons of thiodiglycol, this time giving the end-user as Hallet Enterprises of Singapore. After several months of negotiations, 128,700 pounds of the mustard gas precursor was shipped to Singapore, for which Alcolac was paid \$105,960. New Department of Commerce regulations requiring export licenses for certain CW precursor chemicals, including thiodiglycol, had gone into effect in May, but Alcolac was apparently unaware of the change in the rules and failed to apply for a license. Hallet Enterprises transshipped the chemicals to Hong Kong, then on to Pakistan, and finally to Iran.

On Feb. 8, 1988, Colimex placed its third order with Alcolac, again for 60 tons of thiodyglycol, with Hallet as the declared end-user. By early March, they asked Alcolac to double the order to 120 tons - a very large quantity of this chemical, especially when one realizes that Alcolac was simultaneously shipping similar quantities of thiodyglycol to another Middle Eastern country: Iraq.

In early April, the U.S. Customs Service got wind of the pending deliveries, and initiated an investigation. On April 21, 1988, they intercepted the seven containers loaded with 55-gallon drums full of thiodyglycol as they were waiting to be loaded onto a Singaporean cargo vessel in Norfolk, Virginia. Without Alcolac's knowledge, they substituted water for the chemicals. The containers left on board the *Oriental Friendship* for Singapore the next day.

The ship arrived in Singapore in May. After a brief stopover, during which Hallet Enterprises filed fake shipping documents with the Singaporean authorities, the water-filled containers departed for Iran on May 24, 1988. When the shipment arrived in Karachi on June 4, the containers were transferred onto an Iranian vessel, the *Iran Ekram*, which arrived in Bandar Abbas after a three-week lay-over on July 5.

How the Revolutionary Guards reacted to discovering that their poison gas containers were filled with water is not known. But tensions were high in Bandar Abbas following the shooting down of an Iranian civilian airliner by the *USS Vincennes* two days earlier. (The *Vincennes*, the U.S. Navy's most advanced cruiser, had been ordered into the area in June, following the installation of Iran's first fixed Silkworm missile base at Kuhestak, near Bandar Abbas. The Silkworms, manned by the radical Revolutionary Guards, were capable of sinking any ship passing through the Straits of Hormuz, a vital waterway for Western oil supplies).⁵⁶

In addition to the indictments handed down against Alcolac, the head of Colimex GmbH, Peter Walaschek, and his Iranian contact were also indicted. Customs had Alcolac lure Walaschek to the United States on the promise of additional contracts and

arrested him on July 27 at the Baltimore-Washington International Airport. He fled from a halfway house in December 1988 where he had been placed by the Court while awaiting sentencing. The Iranian, Seyed Karim Ali Sobhani, was expelled from West Germany on June 27, 1989, where he had been serving as a diplomat since 1987. Iran's use of its Bonn Embassy as a focal point for its clandestine procurement network paralleled similar moves by Iraq.

Iranian agents also attempted to procure the nerve gas Sarin in the United States, through a twisted ring of intermediaries that included a South Korean pharmacist living in New Jersey, Juwhan Yun, and a British arms dealer known for his long-standing connections with Libyan intelligence, Charles Caplan. Their efforts were blocked by a U.S. Customs investigation run out of the Newark, New Jersey office starting in November 1988, by Special Agent Richard Kennan. In an interview in Washington, Kennan said that Yun and Caplan had tried to purchase U.S. Army 500 MK 94 bombs, each packed with 108 pounds of sarin, and 500 MK 116 "Weteye" bombs, each packed with 347.5 pounds of the nerve agent. "That's enough sarin, theoretically, to kill 1.5 billion people," Kennan commented.

During a conspiratorial meeting at the Sheraton Park Tower Hotel in London's Knightsbridge district on January 9, 1989, Caplan and Yun were joined by two Frenchmen, Jacques Capmas, who ran a company called Nayral SARL, and Olivier Le Besnerais, of the Paris-based Société Française de Négoce (SFN). When presented with photographs of the U.S.-built chemical bombs, the two Frenchmen offered to use their contacts in Libya to get them tested against the Chadian forces of president Hissen Habré, since Colonel Qaddafi was still smarting from the drubbing his troops had taken at Habré's hands in September 1987. The meeting, which Kennan attended, was videotaped clandestinely by U.S. Customs, with the help of the British authorities.⁵⁷

Other meetings were held at the St. Elizabeth Hotel in Nice with a South Korean businessman, K.Y. Joo, who ran an outfit called Kwang Jin Trading Co. According to

Kennan, Joo was supplying Iran with chemical weapons manufacturing technology, ostensibly for a "cement" project. Iran's principle CW manufacturing plant was believed to be located just south of Tehran.

South Korea is currently negotiating to build a second chemical weapons plant, Pentagon officials said in interviews, that was tied to a United Nations grant. Pegged as a pesticides plant, Iran has received preliminary backing for the project from the UN Industrial Development Organization (UNIDO), which supports plant construction projects in the Third World. In 1987, UNIDO sponsored a semiconductor manufacturing plant in North Korea, which today turns out the Motorola 68000 series chips used in the guidance systems of North Korean ballistic missiles.

According to the officials, in late 1991 and early 1992 the U.S. government solicited help from Japan, Australia, and from Western European governments, in an attempt to reinforce direct pressure from Washington on the Seoul government to scuttle the sale. "This is a subject of utmost concern," one Pentagon official said. Until now, this diplomatic approach has failed to yield results.

When queried about this project, UNIDO representatives in Vienna denied that the Agency was backing any effort to build a pesticides plant in Iran.

An Iranian supergun?

When Yun was arrested by U.S. Customs on January 12, 1989, he was carrying more than thirty U.S. government documents relating to weapons manufacturing, with classifications of "Top Secret" or higher. And yet, he was never charged with espionage. In fact, one of his business partners in the U.S. was a retired two-star General, whose last command had been in Seoul, South Korea. "Half of the time you wind up stepping on the spooks," one undercover Customs agent commented wryly.

To nail down their investigation of Yun and the Sarin case, Customs obtained a court order for the first-ever legal intercept of facsimile communications. Some of the

documents coming over Yun's faxline surprised Special Agent Richard Kennan. "In 1988, Yun received a total of twelve separate drawings from a design bureau in South Korea, for heavy steel forges and parts he was supposed to purchase from American companies. We had a computer simulation run on the drawings by DTSA. When you put them all together, they added up to a single coherent system, which the Yun was ordered to purchase piece by piece from different sources. It was identified as a projectile for Gerald Bull's super-gun."

Customs discovered that engineers from Bull's Space Research Corporation were in fact working in South Korea, and were working in the United States with a retired 2-star general...

"This was the same technique Bull had used to acquire pieces of the supergun for Iraq," Kennan said. But was the new project intended for South Korea, or Iran? "We never found out," Kennan said, his frustration evident. "The judge determined that this case is closed."

The Lessons of Halabja

Toward the end of the war with Iraq, Iranian leaders were convinced they had to become major manufacturers of chemical weapons, and began preparing the Iranian public for extended chemical battles. In late 1987, Prime Minister Hussein Mussavi told an Iranian television audience that Iran was now producing "offensive chemical weapons." On April 13, 1988, Majlis speaker Hashemi-Rafsanjani warned that faced with repeated Iraqi gas attacks Iran "should equip ourselves with defensive weapons." Ten days later, he told reporters that Iran would be capable of equipping all of its forces with chemical weapons "where and when necessary." One reason for Rafsanjani's public conversion to CW was undoubtedly personal: on March 25, 1988 his 16-year old son,

Yasser, who was serving as a student volunteer in the Basij corps, was among the victims of an Iraqi poison gas attack⁵⁸.

But the real impetus came from the shock and horror of the Iraqi gas attack on the Kurdish town of Halabja on March 17-18, 1988. For two whole days, Iraqi Air Force planes and helicopters bombarded the town with poison gas, in retaliation for what Saddam considered the "collaboration" of the villagers, who had failed to resist a successful Iranian attack in the area the week before. When the bombs fell silent, an Iranian Revolutionary Guards video team went into the area, to capture for posterity these "dark pages" of human history. Their film was shown in military training schools and indoctrination centers throughout Iran. But instead of inciting young Iranian recruits to hate Saddam, it instilled in them a fear from which they never recovered. "I am absolutely sure that chemical weapons were a significant factor in ending the Gulf War," Belgian toxicologist Aubin Heyndrickx said in an interview. "The Iranians had an almost religious horror of Iraqi chemical attacks. That's one reason they almost totally evacuated Tehran during the War of the Cities this spring, for fear that Iraqi missiles would be loaded with chemical warheads."

The U.S. intelligence community has repeatedly stated a belief that *both* Iran and Iraq used poison gas against Halabja. They accused Iran specifically of having used cyanide, which Iraq was not then believed to possess. In fact, however, Iraq had acquired cyanide from a German company.⁵⁹ Iran's source of cyanide is discussed below.

Again in July 1988, Iran was accused of having used mustard gas against Iraqi troops, during the final battles of the war. UN experts Erik Dahlgren, Deputy Department chief of NBC Defense at the Swedish Defense Research Institute, and Dr. Manuel Dominiguez Carmona, a Colonel from the Spanish Army Medical Corps, inspected sites of alleged Iranian CW attacks in Sulimaniyah and Basra, and confirmed that the Iraqi soldiers they examined had been victims of mustard gas attacks. However, the report noted that laboratory analysis on samples taken from a depot of Iranian 81mm mortar

munitions captured by Iraq "could not confirm the presence of any chemical warfare agent," as Iraq alleged.

In October 1988, as the fragile ceasefire in the Iran-Iraq war took hold, Rafsanjani again commented on Iran's determination to develop a CBW capability. "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 drops of ink on paper."⁶⁰

CW manufacturing

Reports from Britain in March 1988 affirmed that Iran had built a facility near the town of Damghan, in between the Semnan and Shahroud missile complexes to the east of Tehran, that was manufacturing nerve gas. Production capacity was estimated at 5 tons per month. According to this report, the chemical agents were then shipped to Isfahan, the main ballistic missile assembly plant, where they were fitted into warheads for Iranian Scud-Bs. Iran allegedly successfully test-fired a missile loaded with a nerve gas warhead near Semnan on March 1, 1988.⁶¹ So far, no information has surfaced that would identify foreign companies that had helped build this plant, although it has been surmised that it was part of the follow-on "package" deal signed with North Korea in 1987 concerning missile development.

Iran made a parallel effort to acquire toxic fungi in Canada and the Netherlands, ostensibly for medical research. These attempts were organized by the Iranian Research Organization for Science and Technology, and by the Imam Reza Medical Sciences University at the Meshed Medical Sciences University. The fungi could be used for making powerful biological warfare agents called mycotoxins. In both cases, the Western governments intervened to block the sales.

The Opposition People's Mujahidin of Iran has identified other facilities engaged in the production of chemical weapon precursors and warheads. Primary among them is the

Al Razi chemicals complex, located near a town in southern Iran identified as Mahshar, which they claim produces chemical warheads for rockets and missiles using chemical feed stock produced at Barjisni. Another secret CW plant came under the control of the "Bathet 22" unit of the Revolutionary Guards, and was said to be located in Bahshwir. Additional chemical warheads were said to be produced in the Ghaniabad factory.

The Al Razi plant identified by the Mujahidin would appear to be the Zakaria Razi Chemical Company, which in 1991 tried to purchase sophisticated computer graphics terminals from Tektronix in the United States, but was turned down by the Commerce Department. A request to purchase gas chromatography equipment from another U.S. company is still pending. Such equipment is needed to analyze production samples of chemical warfare agents, to determine the purity and to identify potential defects. The export license applications identified the Zakaria Razi company as a manufacturer of urea ammonia and sulfur for fertilizers.

But the biggest facility had already been built. And it was a consortium of German firms, including chemicals giant Bayer, that did the job.

The Qazvin saga

The Iranian government began discussions in 1984 with Bayer AG of West Germany and Lurgi Metallurgie GmbH (a subsidiary of chemical giant Hoescht AG) , to build a pesticides plant 150 km west of Tehran, near the industrial city of Qazvin. Iran's state-controlled Nargan Consulting Engineers said they wanted to make Amiton, a powerful organic phosphorus compound. The West Germans agreed.

To handle the deal, Bayer set up a subsidiary in Iran called Bayer-Iran Chemie, and began importing equipment from the United States. The complete plant was delivered to Iran and fitted out in Qazvin between November 1987 and January 1988, with equipment and technology provided by Ciba-Geigy of Switzerland, Bayer, an unidentified Yugoslav

company, and BASF in East Germany, which was then part of the huge state-owned chemicals conglomerate, VEB Bitterfeld⁶². In addition to pesticides formulation, a complete packaging line equipped for toxic substances and a toxic waste disposal unit were also ordered. Both were vital for CW production.

Amiton, which is made from phosphorus pentasulfide, was developed in the mid-1950s. It made a brief appearance as a commercial pesticide, but was quickly withdrawn from the market when it was discovered that it was just as toxic to humans as to insects. According to chemical weapons expert Julian Perry-Robinson, of Sussex University in Britain, the British government “considered Amiton as a candidate CW agent in its own right, and at one point classified it as a V-agent, or nerve gas.” Amiton is “just as toxic as Tabun or Sarin, but is especially effective against an enemy wearing gas masks, since it achieves lethality percutaneously” - that is, not by being inhaled, but through contact with the skin.⁶³

Precursor chemicals needed to manufacture Amiton were imported at first from Germany and the United States; later, Pesticides India gladly took over the contract. In response to questions from the German Bundestag about the Qazvin project, the Federal Economics Ministry stated in June 1992 that at the time the contract was executed “the production plant was not subject to international accords or to German regulations.” In other words, it was perfectly legal to build a plant in Iran, a nation at war, that could be used to produce nerve gas.⁶⁴

But the Iranians wanted more than just a “formulation” plant. In late 1987, they approached the Dutch subsidiary of Britain’s John Brown Engineering to build a separate \$37 million factory in Qazvin to manufacture phosphorus pentasulfide. The Iranians said they were about to begin manufacturing Amiton; as a next step, they wanted to make the precursor chemicals as well, instead of importing them from abroad.

Iraq had disguised its poison gas facilities as pesticides plants, and the conviction that Iran was trying to do the same soon spread within the Western intelligence

community. American pressure applied via the Australia group, which was set up to monitor the sale of chemical weapons precursors, soon forced John Brown Engineering to drop out of the race. In late 1988, however, the Iranians found a willing replacement in the Swiss chemicals firm, Krebs AG. Concerned Western diplomats went to work feverishly behind the scenes.

In early 1989, the Americans leaked a working paper they had distributed to the Australia group, called "Pesticide Plant in Iran: US Views." The document fingered the Swiss firm and highlighted the immediate utility such a plant would have for chemical weapons manufacturing. In May 1989, phosphorus pentasulfide was added to the Australia group's list of "Chemical Weapons precursors" as a means of preventing the equipment sales to Iran. Almost immediately, Krebs announced that it was pulling out of the project.⁶⁵

The German companies proved more resistant to such pressure. Lurgi Metallurgie GmbH took on the project to build the precursor production plant, and lobbied hard within the West German government to get it approved. Company officials argued that Lurgi had been retained by the West German manufacturers, "to exclude dual-use" of the facility they intended to build.⁶⁶

In fact, however, the companies involved in the Qazvin project were "urgently warned" as early as April 1987 by the German Federal Intelligence Service, the BND, "about possible use in the production of chemical warfare agents."⁶⁷

On November 14, 1989, the offices of Bayer were raided by German Federal prosecutors, but no charges were brought. Negotiations between the companies and the German government dragged on another two years; in the meantime, Iran could manufacture all the toxic substances it wanted at the Bayer "formulation" plant in Qazvin, using precursor chemicals imported from India.

On June 29, 1991, Federal Economics Minister Jurgen Moelleman traveled to Tehran at the head of a 35-member trade and industry delegation. A strong advocate of

trade with Iran, Moelleman had personally reactivated the German-Iranian Economic Commission earlier that year. He reassured the Iranians that the deal to build the precursor plant at Qazvin was still under consideration and could indeed be approved. To the German press he said that Iran would have to agree to "all kinds of control mechanisms" to ensure there was no diversion to CW production, and stressed that the plant would be built in accordance with the guidelines of the Australia group, the international chemical weapons watchdog.

By this point, the German Federal Intelligence Service, the BND, had issued another warning that Iran was expanding its chemical weapons capability and was actively seeking supplies from companies in Yugoslavia, Czechoslovakia, South Korea, and India. On Nov. 18, 1991, the newsweekly *Der Spiegel* reported that the BND believed Iran had acquired the production plans for Libya's poison gas works at Rabta, and was now trying "to build a copy of that plant" that would use precursor chemicals produced at the proposed Lurgi-Bayer plant in Qazvin.⁶⁸ Meanwhile, intelligence sources began detecting increasing purchases by Iran on the European and Far Eastern market of glass-coated reactor vessels and tubing, which was needed to produce highly toxic substances such as Sarin.⁶⁹

When we queried Lurgi about their involvement in the Qazvin project, we received this indignant reply dated 22 June 1992 from Managing Director E. D. Menges:

“It is well-known to the public and all respective authorities that for the Ghazwin [sic] project no engineering contractor had been appointed and consequently no detail engineering could be started as well as no orders for any piece of equipment could neither be negotiated nor be placed. Therefore, your question whether personnel of ours had been working in Ghazwin is not intelligible for me and no activities of ours may be interpreted as giving reason for that question.” Menges added that the “suspension of our consultancy contract took place already in 1989.”

According to the official reply by the Federal Economics Ministry to the West German Bundestag, however, this is simply not true. Lurgi continued to negotiate with Iran well into 1991, and a formal decision to deny export licenses to the project was only notified to the company in May 1992.

Public attention in Germany over the Lurgi deal has focused only on the last stage of the Qazvin project. "In fact," as senior officials at the Federal Economics Ministry in Bonn explained to us in an interview, "there were four phases of the Qazvin project. We stopped the precursor production facility but were unable to stop any of the formulation equipment, since it was and is on no international control list." Using technology purchased in Germany and Switzerland, Iran can today produce deadly phosphorous organic compounds, and pack them into specially-designed aluminum canisters for weaponization.

Sodium Cyanide

Despite the controls of the Australia Group, Iran managed repeatedly to procure deadly precursor chemicals in Germany. This investigation has discovered conclusive evidence that another German company, Rotexchemie, sold CW agents to Iran in 1989 and 1990 - and perhaps earlier - apparently without declaring these deliveries to the German government.

On Oct. 3, 1990, Turkish Customs officials stopped a Polish cargo vessel that had docked at the Turkish port of Mersin, as it was attempting to unload 102 tons of sodium cyanide, a blood agent used in extremely potent forms of poison gas. Mersin was widely used as a transshipment point for sensitive equipment bound for Iraq.

When this seizure occurred, world attention was then focused on the UN trade embargo against Iraq, and the German supplier of the chemicals, Rotexchemie International Handels GmbH, was wrongly accused of violating the sanctions.

Contacted about the sale by this writer in March 1991, a senior Rotex executive, Gerhard Brunst, replied with quiet exasperation. "Our Belgian client was selling to an *Iranian* mining company," he explained "We have no idea who inserted the word Iraq in all this. We do no business in Iraq. This sale was to *Iran*, where we have been selling this chemical for several years." The Turks returned the entire shipment to Antwerp, Belgium, where it became the property of the Belgian middleman, a company called Atexco.

"Actually, Atexco belongs to a group of Iranians," Herr Brunst said. "They share the same house in Brussels with the Iranian mining company that was the eventual buyer of these chemicals." Although the Iranians pretended they wanted the sodium cyanide for civilian purposes, "we now understand that it can be used for other things," he acknowledged. "But tell me one chemical that does not have two or three or even ten different uses! Since this seizure, we have had three requests to sell additional quantities of sodium cyanide to Iran refused by the German licensing authorities." The company had not applied for a license for the earlier shipments, Brunst acknowledged, which had begun in late 1987 or early 1988.

In a declassified 1990 report, US Army intelligence alleged that cyanide agents had been used by Iran during the battle for Halabja in 1988. If this is in fact the case, then the chemicals used by Iran may have come from Rotexchemie in Hamburg, Germany.

Anthrax

Iran is also believed to be working on biological agents, with particular emphasis on the anthrax virus. Biological weapons research is generally carried out in small research laboratories, associated with Iranian universities.

Anthrax is arguably the most effective, and dangerous, biological agent. "Basically, it survives anything," one government analyst said. "It can take any pressure, any temperature, any environment. This makes it the ideal agent to be launched by a ballistic missile."

Fitting a SCUD-C or other ballistic missile with an anthrax warhead is not considered to present any technical problems. If similar proportions to a Sarin warhead were used, this would allow a single missile to disperse 100 liters of this extremely deadly biological agent, with devastating effect on major population centers. As one Israeli official put it, "I simply cannot say how we would respond if one of our cities were subjected to a BW attack." A city attacked with anthrax would have to be evacuated - if indeed there were enough advance warning to do so. In favorable conditions, experts say it would take several years to thoroughly eliminate the epidemic and make attacked areas safe again for human habitation.

Because it is possible to grow large quantities of bacteria in a short time, countries such as Iran do not need to maintain large stockpiles of anthrax or other infectious agents in order to have an active biological warfare capability. The U.S. government estimates that "only 96 hours are required for the entire process involved in the production of anthrax."⁷⁰ Because of this, a country like Iran could tuck away a few small vials of selected biological agents, imported as part of a perfectly legitimate "civilian" vaccination program, and reproduce them in times of crisis. Anthrax and other BW agents can be dispersed by simple spray dispensers hung on aircraft or helicopters, or by

more sophisticated aerial bomb systems. The one known accident involving anthrax - which took place at a Soviet military laboratory near Sverdlovsk in 1979 - required the total evacuation of a very large area which remains uninhabited to this day.

Nuclear Ambitions

Iran's nuclear program received unusual international attention in February 1992, when a team from the International Atomic Energy Agency (IAEA) in Vienna asked to inspect several hitherto undisclosed nuclear research sites in Iran. Clearly motivated by its earlier failure to detect a clandestine nuclear weapons program in Iraq, the IAEA was anxious to dispel doubts that it was asleep on the switch when it came to Iran as well.

Over the previous year, Iran had made a number of well-publicized attempts to acquire nuclear technologies on the international market place, including a research reactor from India, processing equipment from Brazil, and highly-enriched uranium from France. Iran's nuclear intentions were thrown into doubt when Deputy President Atalollah Mohajerani told an Iranian daily on Oct. 23, 1991 that Iran should strive with its Muslim partners to build an Islamic bomb, in order to counter Israel's nuclear deterrent. The Islamic Bomb was "not the business of the United Nations or of the Security Council," he said.⁷¹

In fact, the Mohajerani statement was only one in a long string of similar statements dating back to 1985, when Iran appears to have revived the clandestine nuclear weapons program launched by the Shah in the 1970s. Iran's current president, Ali Akbar Hashemi-Rafsanjani, was instrumental in reviving the Shah's program, and has clearly placed nuclear weapons research under his personal control.

The February 1992 "familiarization tour" was trumpeted as a resounding success by mission leader Jon Jennekins, a Canadian who heads the IAEA's Safeguards division. In a press conference shortly after his return to Vienna, Jennekins declared that his team had

discovered nothing at the six sites they had visited that was “inconsistent” with normal, civilian nuclear research.

But Jennekins was roundly criticized within the IAEA itself. As one team member said in an interview, “Jennekins has done as much discredit to the Agency by this imprudent and unfounded whitewash as others have done earlier with Iraq.”

The team presented a list of sites it wished to visit to the Iranians, who selected the sites they felt were appropriate. In one key case, the Iranians took the IAEA team to a “decoy” site that had no relation to the actual site on the IAEA list, which is believed to be one of the key facilities for clandestine uranium enrichment. This site, called Ma'alleh Kelayah, is a closed military camp run by the Revolutionary Guards and is located near the city of Qazvin, to the northwest of Tehran. The Iranians took the IAEA team to a village by the same name to the north of Tehran, which housed a vacation resort for employees of the Atomic Energy Organization of Iran (AEOI). The reason this could happen, the sources said, was because the IAEA lacked precise map coordinates for some of the sites it wished to visit. “Besides, this was never intended as a challenge inspection,” one team member said. “It was a familiarization tour, to get a feel for the scope and intent of Iran's nuclear program.”

Exiles return

Iran had embarked on an ambitious nuclear program under the Shah, ostensibly intended to create a civilian nuclear power industry. KWU of Germany, a subsidiary of Siemens, was to build two light-water power reactors at Busheir, while the French State-controlled company, Framatome, contracted to build two additional reactors along the Karun river near the city of Ahwaz.

Iran also bought a 10% financial share in the Eurodif reprocessing conglomerate linking France, Belgium, Spain, and Italy, and loaned \$1 billion in cash to the French

Atomic Energy Commission (CEA) to build a gaseous diffusion enrichment plant at Tricastin in the south of France. Under this 1974 agreement, Iran was to have "full access" to Eurodif enrichment technology, and pledged to purchase a certain quota of the highly-enriched uranium produced at the Tricastin plant.

With the advent of the Islamic Republic in 1979, most of the West German and French nuclear experts left Iran, the power plant contracts were canceled, and Iran called its \$1 billion loan to the CEA. Indeed, the Eurodif dispute took on tragic overtones in subsequent years, when the Iranians conditioned the release of French hostages held in Lebanon to the repayment of the original loan and to deliveries of weapons-grade uranium. At the time of the cancellations, the two Busheir reactors were considered to be 50% and 90% completed. Work on the French reactors at Ahwaz had barely begun.

In April 1984, West German intelligence sources leaked reports to the press that Iran's clandestine nuclear weapons program was so far advanced that it would be capable of producing a bomb "within two years." Although these reports turned out to be greatly exaggerated, it was the first time a Western intelligence agency had publicized suspicions that Iran had revived its nuclear weapons program. Meanwhile, a group of forty West German nuclear engineers visited the Gulf port of Busheir to investigate the possibility of completing at least one of the two unfinished reactors, at the personal insistence of the speaker of the Iranian Parliament, Hashemi Rafsanjani. To demonstrate its intentions to pursue nuclear technology, Iran opened a brand new nuclear research institute at the University of Isfahan that same year, which is today believed to have become one of the focal points of the clandestine nuclear weapons program.

On November 6, 1985, the foreign edition of Tehran's *Kayhan* newspaper ran a government ad inviting all Iranian nuclear scientists to return home, all expenses paid, to attend a nuclear science and technology conference scheduled for March 14-19, 1986 at Busheir. Iraq took rumors that German and Argentinean firms were working in secret to get the Busheir reactors up and running very seriously, and launched a series of bombing

raids against them starting on Feb. 15, 1985, during which a German engineer from KWU was killed. The Iraqis were convinced that Busheir was an integral part of a top secret clandestine nuclear weapons program in Iran. They were right.

In February 1986, Pakistan's top nuclear scientist, Dr. Abdel Qader Khan, secretly visited Busheir, adding fuel to these suspicions. He returned again to the site in January 1987. Dr. Khan is widely considered to have been the father of the Pakistani bomb. In fact, he had been retained as a consultant by the Atomic Energy Organization of Iran, to perform a study on the feasibility of using the Busheir reactors for plutonium-production. Later that year, Pakistan signed a secret nuclear cooperation agreement with Iran that involved the training of Iranian nuclear physicists at the Institute for Nuclear Sciences and Technology in Islamabad, and at the Nuclear Studies Institute in Nowlore. Pakistan had mastered uranium enrichment using the gas ultracentrifuge technique, and plutonium reprocessing. These were considered the two promising clandestine routes to the bomb.⁷²

According to an exiled Iranian nuclear physicist, interviewed by the author in 1987 during an earlier investigation into Iran's nuclear weapons program, a top secret meeting was held in Tehran's Amir Kabir nuclear research center in January 1987, at which it was decided to allocate fresh funds toward developing an atomic device. The overall project was split up into different sections to handle raw materials, uranium enrichment, plutonium reprocessing, technology procurement, and weapons design, and various team leaders were designated. The nuclear effort was presided over by Hashemi-Rafsanjani who, as Majlis speaker, was in a position to allocate funds without informing his fellow parliamentarians. Later that month, the sources said, one of Iran's top nuclear scientists, Fereidun Fesharaki, returned to Iran after a seven year exile during which he had been highly critical of the Islamic Republic. All of his expenses, including round trip airfare, were paid by Tehran regime. Fesharaki had been in charge of the clandestine nuclear weapons program under the Shah.⁷³

A team of French nuclear experts visited Busheir in February 1987 to assess the damage the Iraqi air raids had done to the reactor sites. The French were eager to help Iran rebuild these reactors in compensation for the canceled Ahwaz nuclear power stations they had been building near the border with Iraq. Iran made it clear that nuclear assistance from France would be an excellent argument in favor of releasing French hostages then being held by pro-Iranian groups in Beirut, and continued to insist that France repay the \$1 billion Eurodif debt and deliver enriched uranium.

By 1988, the AEOI decided to hold the nuclear conferences on a yearly basis at the Caspian Sea resort of Ramsar. Exiles interviewed in Europe said they were contacted by Iranian diplomats, who offered them all-expenses paid trips to these conferences, including an exit visa, since many were worried that the authorities would detain them once they had entered Iran. When he addressed one such conference on Oct. 29, 1988, Majlis speaker Hashemi-Rafsanjani exhorted the exiles to return home permanently. "If you do not serve Iran, whom will you serve?"⁷⁴

From this point on, the Iranian nuclear weapons program went into high gear. It was controlled by a small group of senior officials that included Hashemi-Rafsanjani, the commander of the Revolutionary Guards, Mohsen Rezai, the head of the Defense Industries Organization, Ali Akbar Torkan (who became Minister of Defense and Defense Logistics after the 1989 presidential elections), and Dr. Reza Amrollahi, the head of Iran's Atomic Energy Organization. Amrollahi was considered so key to the success of the program that he was appointed as one of Iran's three deputy presidents in 1989.

Operations and logistics, including day to day operations of the nuclear weapons facilities, was placed under the responsibility of the Revolutionary Guards. According to one West European intelligence agency, the Iranians referred to the nuclear weapons program as the "Death Plan," and have allotted more than \$4 billion to the program for the 1991-1994 period.

The Weapons Program

One of the first tasks of the weapons planners was to build suitable facilities for the nuclear program. In 1987, they began secretly moving equipment from the Amirabad Nuclear Center in Tehran (which was renamed the Amir Kabir Technical College, and continued to house the 5 MW research reactor installed by the Americans in the 1960s), to the new nuclear center in Isfahan.

The Isfahan site, unlike the University center in Tehran, was built from the start with expansion in mind. Intelligence sources in Europe say that it consists of many separate building complexes, some of which have been built underground, and is located 4 kilometers outside the city limits, between the villages of Shahrída and Fulashans. Built in secret, the Isfahan nuclear research center was never declared to the IAEA before the 1992 visit. It initially received a subcritical "training reactor," believed to have been purchased from China in 1985. In 1987, the Chinese supplied a small calutron used for the experimental separation of uranium isotopes - a key step in the enrichment process. Intelligence sources now believe that Isfahan is intended to contain process facilities for an entire uranium fuel cycle, and will house a 27 Megawatt plutonium production reactor the Chinese began to build in 1991. U.S. satellite photographs documented the early stages of the reactor construction in September 1991, and triggered public concern in Washington over Chinese-Iranian nuclear cooperation.

At the same time, under the direction of the Revolutionary Guards, a second secret complex, also devoted to uranium enrichment, was built outside the city of Qazvin in an area that came to be known as Ma'allem Kelayah. Foreign contractors were not allowed on this site, which Western observers say made them "all the more suspicious..” Generating equipment supplied to Iran by an Italian company, Ansaldo Gie, allegedly wound up at this site, as did other equipment from German and French suppliers.⁷⁵

Ma'alleh Kelayah is also the site Iran had chosen to install the 10 megawatt nuclear research reactor it negotiated to purchase from India in 1991. India and Iran exchanged nuclear scientists in February, and the reactor deal was actually signed by Indian Foreign Minister Madhav Singh Solanki as part of a scientific and technical cooperation memorandum of understanding on November 11. Intense U.S. pressure, including a lightning trip to Delhi on November 22 by Assistant Secretary of State Reginald Bartholomew, caused India temporarily to cancel plans for this sale. However, by March 1992 it appears to deal was back on track.

In Karaj, just south of Tehran, a Nuclear Medical Research Center was established in 1991, under the auspices of the AEOI. This center was inaugurated with great fanfare by First Vice President Hassan Habibi on May 11, 1991, as a civilian nuclear establishment devoted to nuclear medicine and agricultural research. However, Chinese and Russian technicians have been observed working at this site, Western intelligence agencies reported. Furthermore, a cyclotron accelerator purchased from Ion Beam Applications in Belgium in 1991 was installed in Karaj, an event which has led French intelligence to suspect the beginnings of uranium enrichment research.

The Karun river site abandoned by the French in 1979 has also been revived, and is now known as the Darkovin project. Over the past year it has been protected by a Revolutionary Guards Corps garrison. When Chinese President Yang Shang Kun visited Iran in October 1991, he was taken to Darkovin and to the Isfahan nuclear plant by President Hashemi-Rafsanjani. Yang promised Chinese technical assistance to complete the Darkovin plant as well as the Busheir power plants, still stalled because of German government reticence. In November 1991, Chinese technicians arrived at the Darkovin plant and reportedly have installed equipment for uranium enrichment.

Perhaps the largest of the new sites is located to the northeast of Tehran, near the Caspian Sea town of Gorgan. This project is supervised by Mansour Haj Azim, deputy chairman of the AEOI, and is being studied as the possible site for two 450 megawatt

power reactors Iran is negotiating to purchase from the former Soviet Union. Geological survey work is currently underway with the help of experts from Turkmenistan, according to Western intelligence reports. But this is far from a purely "civilian" nuclear center and was neither visited by the IAEA in February 1992 or declared to the Agency. The intelligence reports also refer to this site as the "Gorgan Al Kabir" center, and note that scientists from Ukraine, Russia, and Kazakhstan are currently working there, with salaries "as high as \$20,000 per month." Two ethnic Russians, Dr. Larichenkov and Dr. Ayshrov, are believed to be heading the research team. At least one is a known nuclear scientist. "The budget for the Gorgan project does not appear in the books of the Central Bank," the intelligence reports state. "Instead, it is being financed from the Great Nuclear Plan and could cost \$3 billion during the first phase, and up to \$6 billion by 1995." Other reports suggest that Tehran has committed \$4.2 billion to nuclear weapons development over the next three years, starting with the current fiscal budget (March 21, 1992).⁷⁶

Finally, in Bandar Abbas the Revolutionary Guards have established a special R&D unit under the direct command of IRGC commander Mohsen Rezai. This unit has been working since 1987 to transform Chinese-supplied Silkworm missiles into a longer-range missile, capable of carrying a small nuclear warhead to ranges of 400 kilometers or more. Tests of missile prototypes were made possible with equipment provided by MBB of Germany, according to the People's Mujahidin of Iran.

Technical assistance

In addition to building new facilities, Iran needed qualified technicians to operate them. Starting in the mid-1980s, Iran began sending out young, "ideologically pure" students to perfect their skills at the best universities in the West, so they could replace the less reliable nuclear technicians inherited from the Shah. Large numbers were sent to Australia; others went to Germany, Britain, and the United States. According to one

Israeli source, Iran succeeded in training between 15,000 and 17,000 young people in this way - not an exaggerated figure when one considers that the Iraqi nuclear effort employed fully 20,000 technicians, according to payroll records seized by the UN Special Commission in July 1991. "Even if worse came to worse and Iran's nuclear facilities were destroyed, at least the basic know-how would remain, just as in Iraq."⁷⁷

Ironically, the skills most needed by a country such as Iran were not in nuclear physics, but in production technology. "With the physics easily accessible on the public record, making a bomb for a country like Iran or Iraq becomes an engineering problem, not a problem of physics. The important skills are in electronics, mechanical engineering, and metallurgy," - precisely the skills Iran has been emphasizing in recent years.⁷⁸

These young Iranians educated abroad would return home to work in the weapons complex, or to instruct others at the Sharif Technical University, which was established in Tehran in the mid-1980s under the auspices of the Revolutionary Guards, to serve as a pool of trained technicians for the nuclear weapons program. Several other universities were also used as procurement and training centers for the nuclear weapons program, including the Engineering Faculty at the University of Mashad, the Amir Kabir Technical College, and the Tarbiat Modarres University.

Mednews has developed an extensive list of Iranian procurement fronts, which will be made available to exporters upon request as a means of helping them determine whether or not their partners in Iran are involved in programs of known proliferation concern.

Skirting controls

Iran understood early on that the best way to disguise its nuclear intentions was to maintain whole areas of its nuclear industry outside the reach of the International Atomic Energy Agency. The IAEA imposes strict controls on nuclear materials and equipment

sold to declared nuclear facilities in countries that have signed the Treaty on the Non-Proliferation of Nuclear Weapons (NPT), which was the case of both Iran and Iraq. The nuclear fuel that was supplied to the Busheir reactors, for instance, was regularly inspected all through the 1980s; any diversion would have immediately triggered a response from the IAEA, and eventually, some form of international sanctions. Instead of taking that risk, Iran sought to acquire its own, unsafeguarded source of uranium, and the technology to enrich it to weapons grade. (Hence the importance of Iran's participation in the Eurodif consortium throughout the 1970s and 1980s).

The weapons program was therefore established in new plants and laboratories which, for the most part, were kept separate from declared facilities. Iran's intention was to build an entire parallel nuclear infrastructure that would remain beyond the purview of international controls.

As the Iraqis discovered, the best way to start was at the beginning: with an unsafeguarded source of uranium. For once your basic material was taken out of the IAEA safeguards loop, there would be no accounting later on to determine whether it had been enriched to weapons grade or not.

South Africa is said to have delivered "large quantities" of uranium concentrate to Iran in 1988 and 1989, which went undeclared to the IAEA.⁷⁹ Then in mid-1989, Iran lucked upon an even better solution, when large uranium deposits were discovered at Saghand, in the eastern province of Yazd. By year's end, Iran had built a large uranium processing plant that employed 800 workers.⁸⁰ This has given Iran a virtually unlimited - and until now, unsafeguarded - supply of natural uranium, which it can enrich to weapons grade using technology imported from China and Pakistan, and equipment purchased in the West.

On Jan. 21, 1990, Defense Minister Ali Akbar Torkan received an important visitor in Tehran. He was the Deputy Director of China's Commission on Science, Technology and Industry for National Defense, General Jiang Xua.

This all-powerful organization was in charge of the Chinese weapons establishment, including arms and technology exports. General Jiang had come to Tehran with the text of a ten-year nuclear cooperation treaty, which he signed with Torkan that same day.⁸¹

The Chinese agreed to expand the Isfahan nuclear research center by building a 27 megawatt research reactor, sold by the China Nuclear Energy Industry Corporation (CNEIC), the export arm of China's Ministry of Energy Resources. The Chinese also pledged additional calutrons and other equipment needed for uranium enrichment. Major construction work was soon detected at the Isfahan site, as was the presence of large numbers of Chinese technicians.

From discussions with U.S. officials at the Department of State, the National Security Council, and the Defense Technology Security Administration (DTSA), it became clear that the United States was aware of China's extensive nuclear cooperation with Iran as early as 1987, but failed to bring up the issue with the Chinese until late 1991. "We could have leveraged the Chinese early on, when they were just starting to give Iran calutron technology," one official said, "but nothing was ever done." DTSA says the first calutrons actually arrived in Iran in 1989, and that it warned the State Department of the transfer at that time, but never received any response.

According to the opposition People's Mujahidin of Iran, Iran tucked away \$200 million in its 1990-1991 budget to finance the nuclear weapons program. The PMOI also claimed that a special unit within the Ministry of Defense, run by two nuclear experts identified only as Dr. Nari and Dr. Mussavi, was set up to organize foreign procurement of nuclear technologies.

U.S. licensing policy

While the United States is far from being Iran's main commercial partner (an honor held by Japan and Germany), the Department of Commerce maintains the best export licensing records of any nation in the world. For this reason, it is easier to get a detailed glimpse of Iranian procurement patterns by examining purchasing records in the United States.

It should be emphasized, however, that some of Iran's major suppliers do not even keep track of most dual-use equipment shipped to Iran. France only began licensing chemical manufacturing equipment to countries of proliferation concern in 1992 (the French won't even hazard a guess as to what they shipped before then), while neither Britain, Italy, or Japan maintain lists of any sort detailing their exports to the Middle East. Germany has reported to parliament on several occasions on its licensing policy toward Iran.

British officials at the Department of Trade and Industry were particularly prickly on the subject, claiming that they didn't have the software necessary to analyze foreign procurement patterns - a capability accessible to any computer-literate professional using commercially-available software.⁸²

And Czechoslovakia - just to mention one of the former Soviet bloc nations - has been shipping large quantities of chemical goods, manufacturing equipment, and HMX explosive to Iran for years, sources in Prague indicated, through its Omnipol and TechnoExport foreign trade organizations. HMX is a crucial element for detonating nuclear explosive devices. The presence of large quantities of HMX in Iraq is one of the clues that tipped off UN inspectors that Iraq was engaged in clandestine nuclear weapons research. Analysts believe the same holds true in Iran.

The United States has applied foreign policy controls on export licenses to Iran since the hostage crisis in 1979. These controls were tightened significantly in 1987, adding a "presumption of denial" to most sales of high technology goods from the United States to Iran.

Notwithstanding these restrictions, the Commerce Department has approved a significant volume of high technology sales to Iran, in many cases simply ignoring or at the very best overruling negative assessments put forward by other agencies, including the Department of Energy (which oversees exports of potential nuclear concern), and the Department of Defense (which looks at strategic manufacturing technology).⁸³

Furthermore, while certain precursor chemicals were controlled because of their inclusion on the Australia lists, starting in 1984, and some missile production equipment was controlled because it was included on the MTCR lists, starting in 1985,⁸⁴ much nuclear-significant technology was never subjected to control at all before the London Nuclear Supplier's Group revised its list in January 1992.

This was particularly the case of so-called "dual-use" items that were not specifically related to uranium enrichment or to plutonium reprocessing - in other words, virtually the entire Iranian wish list. Thus it would appear that Iran was able to procure in the West large quantities of manufacturing, analysis, and test equipment for its nuclear weapons program during the late 1980s and early 1990s, with few impediments.

A thorough examination of Commerce Department records from 1987 through 1990 brings to light some rather startling trends which, were similar statistics available, we believe would prove manifest in other Western supplying nations.

- Over this four year period, the Department of Commerce approved 401 out of a total of 758 license applications (53%), for a total value of \$324,595,446. This amounts to slightly less than half the dollar value of high-tech equipment actually shipped to Iraq from the U.S. during the same period, when Iraq was *not* subject to foreign policy controls.

- Equipment shipped to Iran included exceptionally high quantities of advanced computers and scientific analysis equipment. Many items were similar to equipment shipped to Iraq, which has since been shown to have fed directly into the Iraqi war

machine. Specifically, 292 of the 401 licenses granted over this period involved \$170 million worth of computers which were considered to have a potential nuclear "end-use."

- 60% of all Iranian license applications during this period were for items listed on the "Nuclear Referral List," which covers equipment, technologies, and materials considered by the U.S. nuclear weapons establishment to be particularly useful to weapons production. Of these 456 "nuclear-relevant" applications, 306 were approved, for a declared market value of \$171,094,839.

- Iran understood that the end of its war with Iraq in 1988 opened the way to massive high-tech purchases in the West. While the denial rate for Iranian licenses rose steadily, from 18.5% in 1988 to over 51% in 1990, the dollar value of the equipment approved for sale to Iran also increased, topping \$183 million in 1990 alone. Emboldened by this sign of the good intentions of the Bush Administration, Iran increased its requests for U.S. high technology goods *seven fold* in 1990, from \$131,589,535 in 1989 to over \$871 million.

- In 1990 and 1991 Iran attempted to purchase commercial aircraft and aircraft engines worth more than \$2 billion for Iran Air and its domestic carrier, Iran Asseman. Most of these licenses were still pending as of October 1991 (only \$68 million was directly approved), whereas large shipments of nuclear-related computers were approved during this period, despite reservations notified to Commerce by the Department of Energy because of suspected nuclear end-use. (Engines to equip two European-built Airbus civilian airliners were approved in April 1992).

The DoC granted 337 licenses for the sale of American high-tech commodities to Iran between the time President Bush took office through Oct. 1991, the date of the most recent records available. These goods were worth \$293,562,636. While certainly this did not make Iran America's best customer in the Middle East, Iran was clearly a growing market and one that the Administration wanted to open to U.S. manufacturers. The Department of Commerce was therefore under tremendous pressure from the

Administration and from the exporting community to "get smart" on export licensing policing toward Iran, and was required to justify on a case by case basis why it continued to refuse licenses for equipment that American allies abroad were shipping on a regular basis to Iran. This pressure only increased following Iraq's invasion of Kuwait, when the Bush White House was keen to signal its appreciation for Iran's neutral stance in the buildup to Operation Desert Storm.

Far from singling out America's export licensing policy toward Iran during this period, our investigation has determined that what happened in the U.S. is merely endemic of the trend throughout the West, where Iran was actively seeking components and technologies for its nuclear weapons and other unconventional weapons programs through commercial channels.

In Germany, nuclear exports to Iran reached such a critical phase this year that the Federal Economics Ministry drafted an emergency ordinance which it published on April 15, two months after its tough new Foreign Trade and Exports Act was adopted, to specifically block shipments then underway from German companies to the Iranian nuclear project at Busheir.⁸⁵ In France, despite firm denials by the Commissariat de l'Energie Atomique and other French officials, rumors still persist of "secret clauses" to the Eurodif settlement that was finally signed on Dec. 29, 1991. Speculation has focused on possible clandestine shipments of enriched uranium (unlikely), and the training of Iranian nuclear technicians in France.

License applicants in the U.S. for sales to Iran of equipment listed on the Nuclear Referral List (excluding computers) included the following companies:

- Eastman Kodak Co
- Farwest Special Products Inc
- Frequency & Time Systems Inc
- Halliburton Logging Services
- Linotype Limited

- Lot Gmbh
- Mitsubishi Heavy Industries
- Pacific Scientific Co
- Ray Amiri Computer Consultant⁸⁶
- Schlumberger Technology Corp
- Siemens Capital Corp
- Siemens Corp
- Siemens Telecomunicazioni Spa
- Terrin Associates Ltd

A further 32 companies all exported computing equipment worth \$300,000 or more: Advanced Directory Systems Inc, Arthur L Montgomery, Asea Brown Boveri AG, BBC Brown Boveri & Co , Biosound Inc, Bull , Cos Computer Systems Inc, Digital equipment Corporation, Edlow International company, Finnigan Corp, Fisher Controls Intl Inc, Gearhart Industries Inc, General Electric co, Honeywell Bull, Honeywell Inc, Intergraph Corporation, Intl'l Electronic Enterprises, Kraan Bouwcomputing Bv, M.L. Holding Enterprises, Mitac Intl Corp, Mitsubishi Heavy Industries Lt, MK Associates , Modular Computer Systems, NCR Inc, Nord Agrar Inc, Picker International Inc, Recognition Equipment Inc, Safego International Coporation, Schlumberger Well Services Div, Seagate Technology Inc, Smith Drilling Systems, Sun Microsystems Inc.

Loose nukes

Rumors began spreading in the Middle East in October 1991, that Iran had succeeded in purchasing unidentified nuclear warheads from Kazakhstan. One account, published in Cairo's *Al Ahrām* daily on Oct 13, said that five tactical nuclear missiles had been transferred to Iran, but provided no further details.

As the autumn went on, other versions of the same story began to appear. The number of warheads soon became three, the type of system became imprecise; however, the reports all agreed on a few important details. Iran had acquired the warheads from the Semipalatinsk nuclear complex in Kazakhstan, through a group of intermediaries who said they represented an organization which had members in several republics. (This appears to be a reference to the Kurchatov Nuclear Research Institute, which was responsible for Semipalatinsk-21 and a large number of other nuclear facilities spread across the FSU). The warheads were to be dismantled sometime in December and transferred by truck and rail over the border to Turkmenistan, and on into Iran's eastern province. A team of 25 nuclear weapons technicians who had worked at Semipalatinsk were to follow to reassemble the weapons and break the nuclear safety "codes" that protected accidental firing or theft.⁸⁷

As these rumors gained consistency toward late January and early February 1992, the U.S. intelligence community launched its investigation, but came up empty-handed. "We looked at every one of these stories in great detail," one senior Bush Administration said during an interview in Washington, "and we never found any corroborating evidence. Still, the very idea that such a thing could happen is a very serious concern, and we continue to monitor the situation actively."⁸⁸

Then at the end of March, the first official hint of a confirmation appeared, in the form of a briefing given in Ukraine to members of the Washington-based International Security Council Russian General Viktor Samoilov, who is in charge of disarmament questions at the Commonwealth of Independent States general staff. Three nuclear warheads had indeed gone missing, Samoilov said. The problem was that there were too many unauthorized people who had access to storage depots, he explained, especially outside Russia and Ukraine. Despite extremely stringent measures, intruders had made off with the warheads without being detected.⁸⁹

On March 28, CNN quoted Samoilov as saying that “three more warheads” had gone missing, and had presumably been transferred from a depot in Kazakhstan to the government of Iran.

On April 30, the London-based weekly, *The European*, claimed to have received a top secret report emanating from the newly formed Foreign Intelligence Service in Russia, which provided additional details. Iran had definitely received two of the three missing warheads, which were now identified as tactical nuclear artillery shells with an explosive power of between two and five kilotons (the Hiroshima bomb had a power of 20 kt). They had been stolen from the Semipalatinsk nuclear range in Kazakhstan, which had been officially closed by Kazakh president Nursultan Nazarbayev on Aug 29, 1991 as a gesture of his government’s commitment to nuclear non-proliferation. Furthermore, the report alleged, the organization selling the weapons had direct ties to Nazarbayev personally, who was said to have taken a shareholding in a Swiss company engaged in technology transfer. (We had received similar reports of President Nazarbayev's personal interest in Swiss-based nuclear trading firms from a West European intelligence service in March - two months before *The European's* report - but had been unable to confirm them).⁹⁰

These reports came in a context of increasing military and strategic cooperation between Iran and Syria. Syria's chief of Staff, General Hikmat Shahabi, went to Tehran for a 6-day inspection tour of Iranian weapons plants and nuclear facilities starting on Sept 26, 1991. The two countries were said to have signed a nuclear pact in January 1992, with Iran reportedly offering to extend a "nuclear umbrella" over Syria in the event of an Israeli attack.⁹¹

At a conference in Rome sponsored by the Italian Helsinki Committee on June 15-16, 1992, the founder of the Nevada-Semipalatinsk Association, Kazakh deputy Olzhas Sulejmanov, rebutted the rumors of the missing nukes. According to his account, three nuclear artillery shells had indeed "gone missing" at the end of 1991, but were

subsequently found in mine shafts dug 600 meters down below the Semipalatinsk proving ground. They had been prepared for testing when Mikhail Gorbachev declared a unilateral moratorium of nuclear tests. "“I assure you," Sulejmanov insisted: "these three warheads are not missing. They are still sitting in mine shafts 600 meters beneath the earth at the Semipalatinsk test polygon, waiting for a resumption of nuclear tests.””⁹²

Lack of Russian Export Controls

But Iran need not purchase off-the-shelf nuclear weapons. Russia is fast on the way to becoming the next nuclear Stop ‘N Shop for the Third World, recent statements by senior Russian officials shows. With no export control system, widespread corruption, and little incentive at the top to do anything about it, Moscow will soon be facing the prospect of a widescale hemorrhage of strategic technologies to the Third World. Over the next decade a half-dozen new nuclear weapons states could emerge whose bombs will bear the stamp “Made in the FSU.”

In statements to a conference in Rome organized by the Italian Helsinki Committee, Vladimir Lopatin, deputy Chairman of the VPK, revealed that his country currently has no means of controlling the export of dual-use technologies.

Thousands of companies in Russia and in the Newly Independent States continue to manufacture critical components of use in building ballistic missiles, chemical warfare agents, and nuclear weapons, he said, but since they do not manufacture complete weapons systems they are not considered an integral part of the military-industrial complex.. “These companies are not subjected to any form of government control,” Lopatin acknowledged. “We would have to have people in each and every factory to know what they are doing. This is beyond our means.””⁹³

Although he is only 31, Lopatin has been appointed by Boris Yeltsin as Deputy Chairman of the Russian Military Industrial Commission, or VPK, which during the Cold

War directed the theft of strategic technologies from the West. Indeed, the VPK may have taught countries such as Iraq how to get around Western export controls, since this was its favorite sport for over twenty years. Now the VPK is supposed to contribute to the conversion of the military industries, and perhaps for this reason wants to sell off Russian high-tech for hard currency.

In addition to a total lack of dual-use controls, Russia “exercises no control whatsoever” over domestic arms sales, Lopatin said. “Domestic” in this case means any transaction that is not a direct export from the territory of the Former Soviet Union. Factory owners are free to make such sales for their personal profit, filling out the arsenals of militia groups, local armies, and front companies with the latest Soviet tanks, rocket launchers, and tactical missiles.

Without an effective export control system, Russia is fast on the way to becoming the next nuclear "Stop 'N Shop" for the Third World. To prevent this, the West should extend technical assistance to help the Russians set up a domestic COCOM type system, to make sure that strategic technologies do not get auctioned off to dummy companies established in other republics of the Commonwealth of Independent States.

Industrial projects of concern

In addition to specifically nuclear-related purchases, many large-scale industrial projects in Iran should be tracked for their potential contributions to strategic weapons manufacturing, since they make major contributions to Iran's basic infrastructure, especially in the chemicals and steel industries, and in heavy engineering. Among these projects of concern:

- the expansion of the Isfahan steel plant, currently underway with help from Danieli of Italy, and Nippon Steel of Japan. This plant is located within the largest

weapons manufacturing complex in Iran, and will undoubtedly feed Iranian ballistic missile programs.

- Similarly, the Mobarakeh steel plant, under construction some 70 km outside Isfahan, will also feed into the weapons programs. This plant is being designed by Italmobiliare of Italy, with assistance from Kobe Steel, Marubeni, Nippon, and Kawasaki Steel of Japan, Balmin Kommerz of Switzerland, and Showa Denka of Denmark.

- Mannesman Demag, of Germany, is working to restore production at the Ahwaz steel plant to the pre-revolutionary capacity of 300,000 tons, later raising it to 860,000 t/year. This project is of concern because of its proximity to the Darkhovin nuclear research site, and because the supplier has a proven track record of selling dual-use technology to Iraq.

- The Arak Petrochemicals plant, a \$1.5 billion "megaproject" spearheaded by Spie Batignolles and Speichem of France, and TPL of Italy. When completed, this complex will be capable of producing 240,000 tons/year of ethylene, a basic chemical from which a wide variety of plastics, industrial chemicals, explosives, and chemical warfare agents can be derived. Ethylene plants form the basis of any modern petrochemicals industry, and their versatility alone makes them prime candidates for future monitoring. Major subcontractors include Degrément (water treatment), Cegelec (electrical installations), and Air Liquide of France; Kawasaki Heavy Industries, and Marubeni (boilers, heavy equipment) of Japan; and Davy McKee (alcohol/oxygen/industrial gases) of Britain.

- The Tabriz Petrochemicals complex. Of concern here is the very large ethylene manufacturing capability, which is inherently dual use, contracted out to Technip (France) and its sister company TPL in Italy.

- The Khorassan fertilizer plant. This very large (\$400 million) complex was contracted out in Jan 1992 to MW Kellogg (UK), renowned for its work on the Manhattan Project in the 1940s and as a major supplier of nerve gas to the U.S. Army in the 1950s and 1960s. Urea and ammonia from this plant could have direct military uses,

in the production of explosives and CW agents. Company officials say that the plant's ammonia production line could also be used to produce heavy water. Kawasaki Heavy Industry and Tomen Corp of Japan will be major subcontractors.

- The Italian-German heavy vehicle consortium, Iveco-Magirus, contracted in 1991 with Iran Zamyed Co to deliver 5,000 semi-trailors worth \$329 million, and to build an assembly plant in Iran. These vehicles have direct military applications.

- The Lausanne Construction Company, of Switzerland, has contracted to build very large "water-carrying tunnels," ostensibly for agricultural irrigation. However, an attempt to purchase \$35 million worth of specialized equipment through M & A Exporting Company Inc was rejected out of hand by the U.S. authorities, because of potential diversion to military projects.

- Two major projects in the vicinity of Qazvin, where the Revolutionary Guards have established a secret uranium enrichment plant, need close monitoring. These are a powder metallurgy plant, inaugurated in July 1991, and a 1200 megawatt power station under construction by Mitsubishi Heavy Industries. If Iran has opted, for instance, for the gaseous diffusion method of uranium enrichment (which it may have acquired from the Eurodif consortium in France), then it needs a large, dedicated power source. Calutron enrichment also requires a large power source. The conjunction of these two industrial establishments so close to the uranium enrichment plant is in itself cause for concern.

Conclusion

Iran has embarked on a major program of remilitarization, that includes a dramatic buildup of its conventional forces and the vigorous development of a "strategic triad" of unconventional weapons: chemical and biological agents, nuclear weapons, and ballistic launch vectors.

It has been aided extensively by China and North Korea in its unconventional weapons programs, but has turned to the West for more advanced manufacturing technologies, taking advantage of weak export control laws. Once again, Germany has played a key role in selling dual-use technology which has wound up in Iranian chemical weapons programs. Most of these sales occurred at the same time German companies were selling similar technology to Iraq and to Libya.

Meanwhile, Iran has made a strong diplomatic push among the Muslim republics of the Former Soviet Union since early 1991, in an attempt to form new alliances and trading partners. Trade agreements have been signed with Turmenistan, Tajikistan, Kazakhstan, Azerbaijan and the Ukraine. By proposing to help them export their oil and raw materials through its Gulf sea ports, Iran is offering these countries an alternative to trade with Moscow and clearly hopes to position itself as the dominant military, political, and economic power in the region, at the hub of new trading routes.

Iran's ambition is to form a "Third force" in world affairs, an "Islamic Crescent" that would bring under Iranian guidance the Muslim nations from the borders of China and Russia in the East, to Iraq, Syria, and Lebanon in the West. So far, however, Iran's ambition has been checked in Central Asia by the counterweights of Turkey and Saudi Arabia, who have been spreading alternate visions of Islam, and by the cultural weight of 70 years of communist rule, which continues to impede a true religious revival. Of the six Muslim republics of the FSU, only Azerbaijan shares Iran's Shiite theology; elsewhere, Sunni Islam is predominant. Iran's messianic religious message has been greeted with a decided lack of enthusiasm by the predominantly lay leaders of the other republics. Iran's influence in the "Islamic Crescent" appears for now to be limited to trade, rather than ideology.

To its west, Iran has strengthened ties with Syria, and continues to put pressure on the Baghdad regime through clandestine support to Shiite opposition forces active in southern Iraq. Iranian support for Hezbollah in Lebanon, and for the Islamic government

in Sudan, are important factors in Iran's strategy to become the acknowledged leader of the Muslim world. For as long as the current regime keeps its hold on power in Tehran, this will inevitably put Iran on a crash course with Israel as the rival power in the region.

In the military arena, the acquisition of a few tactical nuclear warheads from Kazakhstan - a spectacular development, if true - does not transform Iran overnight into a nuclear power. Iran has no nuclear strike force, and certainly has no second strike capability. At best, these weapons could serve as a deterrent to Iraq, and are probably intended to serve domestic public opinion more than anything else, to show that Iran can no longer be threatened or bullied by Iraq. Strategically, they have little value.

Far more worrisome is Iran's long-term development of an indigenous nuclear weapons capability, especially when coupled to its ability to manufacture ballistic missiles with enough range to reach targets in more than a dozen neighboring countries. The West can slow the development of nuclear weapons in Iran by rigorously enforcing export controls and by bringing strong international pressure to bear on Iran's rogue suppliers, China and North Korea. However, given the growing technological sophistication in Iran, and its broad-based industrial development, it is unlikely that Iran's nuclear weapons program can be stopped. For as long as the causes of instability in the Middle East remain untreated, (the Arab-Israeli conflict, the Iran-Iraq conflict, the friction between radical and moderate versions of Islam, the threat to non-Islamic minorities such as the Christian communities in Lebanon and Armenia, and other ethnic conflicts which have yet to emerge), Iran will continue to pursue this indigenous nuclear weapons program as a means to imposing its political domination over the region by demonstrating its technological superiority. Without a new regional order, Iran will possess a nuclear arsenal within a matter of years that will make it *the* power that must be reckoned with.

III. Syria

Overview

Syria has gone through successive military buildups over the past twenty-five years, driven by the level of foreign subsidies and low-interest loans it has received from Saudi Arabia, Kuwait, and the Former Soviet Union. Following the 1967 war, Syria embarked on a military expansion program to increase the size and sophistication of its arsenal, in preparation for the 1973 attack against Israel. A second wave of Syrian military expansion occurred between 1979 and 1985, when President Hafez al Assad announced that Syria should attain "strategic parity" with Israel. Given the increasing fragmentation of the Arab world, and the intensity of inter-Arab conflicts, Syria argued that its forces should be large enough and well enough equipped to stand alone against the Jewish state on the battlefield. Despite the economic downturn in the late 1980s, this continues to be Syria's declared policy.⁹⁴

Syria considered embarking on nuclear weapons research in the late 1960s as news of Israel's nuclear program filtered out, but rejected this option as too costly and beyond the nation's technological and industrial capabilities. When Air Force General Hafez al Assad seized power in 1970, he set aside the nuclear option in favor of a more "realistic" policy based on conventional military superiority over Israel.

In early 1973, Syria received its first shipment of short-range FROG missiles from the Soviet Union, which it used with considerable success in attacks against Israeli airfields in the opening hours of the 1973 war. This experience gave Syrian military planners their first concrete experience of the utility of stand-off delivery vectors, and may have enticed them to seek unconventional warheads to equip such missiles.

In 1972, Syria is believed to have received shipments from Egypt of artillery shells filled with CW agents, which it did not use in the 1973 war. Later, with help from West

European suppliers, Syria developed its own chemical weapons manufacturing capability. By the mid-1980s, Syria was believed capable of equipping not only its FROG-7 but its longer-range Scud-B missiles with chemical warheads.

Although Syria's military build-up ran out of steam in 1985, it has been given a boost since Operation Desert Storm by the influx of fresh Saudi funds, widely estimated at \$2 billion. Syria has used at least one-fourth of this amount for new missile purchases from China and North Korea, and in recent months has embarked on an embryonic nuclear program with Chinese aid.

Chemical Weapons

Syria received its first deliveries of chemical weapons agents from Egypt in the early 1970s, when the two countries were still bound by mutual defense and cooperation treaties. These were in the form of chemically-filled artillery shells. However, neither Syria nor Egypt used these weapons against Israel during the 1973 war, apparently considering them as a deterrent to a suspected chemical weapons arsenal in Israel.

Little has been published about how Syria went on to develop its own chemical weapons manufacturing capability. The following account must therefore be considered an interim report. It is our hope that these preliminary findings will spark further research by others.

In his testimony before the Senate Committee on Governmental Affairs on February 9, 1989, CIA Director William Webster stated that "Syria began producing chemical warfare agents and munitions in the mid-1980's, and currently has a chemical warfare production facility." The Syrian program was "quite closely held," Webster acknowledged. However, the CIA had determined that foreign assistance was of "critical importance in allowing Syria to develop its chemical warfare capability. West European firms were instrumental in supplying the required precursor chemicals and equipment.

Without the provision of these key elements, Damascus would not have been able to produce chemical weapons".⁹⁵

In addition to mustard gas, Syria is known to be manufacturing nerve gas agents, including sarin and tabun. It is currently capable of packing CW agents into a wide variety of munitions, such as artillery shells and rockets, aerial bombs, and ballistic missiles. Israeli intelligence analysts believe that Syria is actively seeking to manufacture VX agents, which are several magnitudes more powerful than other nerve agents. Syria's current CW stockpiles have been estimated at "several thousand aerial bombs, filled mostly with sarin," and between 50 to 100 ballistic missile warheads.⁹⁶

Following its initial acquisition of CW artillery shells from Egypt, Syria purchased defensive chemical warfare gear from the USSR and from Czechoslovakia in the late 1970s, but the Soviets are said to have consistently refused to provide manufacturing processes or assistance in building CW facilities in Syria.⁹⁷

Soviet unease over Syrian intentions to build up its CW manufacturing capability crystallized in March 1988, when the High Command dispatched to Syria the commander of Soviet chemical warfare forces, Col. General Vladimir Pikalov, to explore a Syrian request to receive SS-23 missiles, a more accurate follow-on to the venerable Scud-B that was capable of launching a 1,000 kg warhead to a distance of more than 500 kilometers. Concerned with the desire expressed by the Syrians to equip these missiles with CW warheads, Pikalov returned to Damascus in early June 1988, not only to reject the missile request, but to sternly lecture the Syrians that the USSR was not in the game of proliferating chemical weapons. "Basically, Pikalov read the Syrians the riot act."⁹⁸

Syria is now believed capable of producing several hundred tons of CW agents per year. Four production sites have been positively identified, one located just north of Damascus, and the second near the industrial city of Homs. The third, in Hama, is believed to be producing VX agents in addition to sarin and tabun. Officials in Washington identified a fourth facility dedicated to the production of biological agents in

Cerin, while Israeli intelligence is monitoring several additional "suspicious" sites. Israeli Chief of Staff Ehud Baraq told an audience of leading industrialists in Tel Aviv on December 6, 1991 that Syria's chemical weapons capability was "larger than Iraq's."⁹⁹ Several dual-use sites are also of concern, including a pharmaceuticals plant in Aleppo that was left mysteriously "unfinished" in 1989 after the Syrian government had invested nearly \$40 million in its construction. Syria also runs a large urea and ammonia plant in Homs, and plans to build a \$500 million super-phosphate complex in the desert near Palmyra.

Syrian CW factories have been operating for more than ten years, intelligence analysts agree. Stockpiles of precursor chemicals were purchased in the West in the early 1980s before their export was controlled. Unlike Iraq and Libya, Syria's CW plants tend to be relatively small, and as a result have been harder to detect. In addition to dedicated facilities, Syria can tap the potential of more than a dozen government-run pharmaceuticals plants spread across the country, which could be converted rapidly to produce a wide variety of CBW agents.

A 1983 Amnesty International report alleged that cyanide gas containers had been brought into the city of Hama during the anti-government uprising in February 1982, and "connected by rubber pipes to the entrances of buildings." This would indicate a very early development of a limited indigenous CW capability. During the repression of the Hama revolt, at least 20,000 Syrians reportedly were killed by Special Forces troops under the orders of Rifaat al Assad, the President's unruly younger brother.

Help from Europe

Syria's principle suppliers of CBW production technology were large chemical brokerage houses in Holland, Switzerland, France, Austria and Germany, including many of the same companies that were supplying Iraq.

At least one German company, Schott Glasswerke, has been subjected to an official inquiry, for its delivery of glass-lined reactor vessels, sarin precursors and production equipment to a suspected Syrian poison gas plant.¹⁰⁰ And one French source suggests that the United States may have supplied Syria with precursors and CW production equipment prior to 1986, at which point Syria was subjected to international sanctions for its attempt to plant a bomb on an El Al plane in London.¹⁰¹

But so far, Syria has remained far more discreet in its purchasing patterns than either Iran, Iraq, or Libya, preferring the gradual buildup of its CW capability to dramatic - and highly visible - purchases on the open market and the construction of large, dedicated facilities. As one senior intelligence analyst explained, Syria considers chemical and biological weapons as "strategic" systems, meaning they are intended more as a deterrent than for recurrent, tactical use on the battlefield. Therefore, instead of producing large quantities of CBW agents, Syria is seeking to develop a smaller but high quality arsenal, which it can deliver accurately against military targets.

Syria has used the expansion of its pharmaceuticals industry as a convenient cover for purchases relating to its CW program, since this is an area where is impossible to distinguish legitimate civilian projects from military programs. "Anyone knows that a good pharmaceuticals plant is capable of producing chemical weapons or biological agents," a British executive from the large chemical engineering firm, M.W. Kellogg, said in an interview. "But this doesn't prevent us from making a sale, once we get all the necessary permits."¹⁰²

Because of this, it is extremely difficult to pinpoint a specific factory as a dedicated chemical weapons facility. However, the use of pharmaceuticals plants for poison gas production appears to have led to a series of accidents in recent years. In 1991, the Syrian Ministry of Health was compelled to close down five pharmaceuticals plants (three in Aleppo, one in Damascus, and one in Homs), following what were termed "complaints from citizens and doctors" that products "did not meet the required standards."¹⁰³ Later in

1991, Syria signed a cooperation agreement with Libya in 1991 that called for Syrian experts to train the Libyans in pharmaceuticals production. (Libya is also using pharmaceuticals plants as a cover for its CW programs, as will be discussed below).

Major German pharmaceuticals, chemicals, and machine-building companies have helped Syria to establish its modest and well-dispersed production facilities, some with the support of official "Hermes" export credits from the German government. In addition to Schott Glasswerke, which continues to export licensed goods to Syrian chemicals plants, special mixing vats, high temperature furnaces, hot isostatic presses (HIP) and sophisticated machine-tools have been shipped with German export licenses to Syria's Scientific Research Council (CERS) by Ferrostaal, Carl Schenck, Leifeld, Weber GmbH, and other major German companies.

Syria's French Connection

But it is France which has played the key role in building up Syria's very well developed pharmaceuticals industry. With the active encouragement of the French embassy in Damascus and French government export credits, the biggest names in the French pharmaceuticals industry flocked to Damascus in the 1980s. Many of them opened branch offices and built production facilities in Syria, to make French pharmaceuticals under license. As a result of this active government policy to promote French investment in Syria, the French increased their share from 13.11% of Syria's pharmaceuticals imports in 1982 to 23% by 1986. This was all the more unusual since Syria was expanding its domestic production and therefore importing less during this same period.

The French government screens exports to determine whether goods proposed for sale to Syria, Iran, Libya (and other countries) merit review because of proliferation concerns. While France has been applying the guidelines of the Nuclear Suppliers Group

and the Missile Technology Control Regime for several years, she only began applying controls on production equipment that could go into a chemical weapons plant in early 1992. "Only in the past six months has there been a universal will to impose this type of controls," a senior French foreign ministry official said in May 1992. "Before then, CW production equipment was freely available."¹⁰⁴

Like Britain and Italy, France has been unwilling to impose unilateral export controls on CW production equipment without an internationally-accepted control regime, so French companies could not accuse the government of putting them at a disadvantage on lucrative Third World markets. The Australia Group, which oversees the control of CW precursors, only finalized a list of production equipment that should also be subjected to international controls in late 1991. It was only adopted (after stiff opposition from France and Great Britain) in June 1992.

"Every day I sign off on export licenses," another senior French licensing official present at the same forum said, "and I wonder whether I have not just signed my resignation. In the area of chemical weapons manufacturing equipment, it is totally impossible to distinguish between civilian and military end-use," he admitted. "The equipment is strictly identical."

Neither licensing official would hazard a guess at how much CW production equipment had actually been shipped from France to Iran, Syria, or Libya over the past five years. "Even if we wanted to give an answer, we would have no way of knowing, since there have been no records on this type of sale until very recently." Indeed, France only began to computerize export licensing records in 1990. As this report goes to press, it appears that the hemorrhage of French technology was enormous.

Pharmaceuticals plants

Since Syria simplified the procedures for foreign investments in a May 1991 law, the pharmaceuticals sector has been targeted by Syrian planners for additional expansion. New Syria companies are being set up almost every month, to negotiate licensing and technology transfer agreements with foreign suppliers.

The largest project of this kind has been announced by a well-known Syrian businessman, Saeb Nahas, whose GAS group is partially owned by the Syrian state. GAS owns a 51% share in the newly-formed Ibn Zahr Pharmaceuticals Company, which claims to be negotiating to build "one of the largest pharmaceuticals plants in the Middle East" at a cost of \$15 million. Discussions are currently under way with companies in Germany, Britain, and Holland to obtain production licenses and manufacturing technology, and with the European Community to obtain export financing. The EC pledged to give Syria \$204 million in loans and grants in February 1991, with \$75 million of this pledged by German Foreign Minister Hans-Dietrich Genscher during a trip to Damascus, as a reward for Syria's support of the Allied war effort against Iraq.¹⁰⁵

While the pharmaceuticals and chemicals plants put out to tender by the GAS group and its subsidiary companies (Al Zahrawi, Al Kimia, Ibn Zahr) have a legitimate civilian use, the technologies and equipment they require could just as easily be applied to CBW production as to the manufacture of antibiotics or birth control pills. So far, there has been no discussion of controls placed on sales to these newly-created Syrian establishments to ensure there will be no diversion to military programs.

Similarly, the American medical supplier group, Baxter International, has contracted to build a factory to produce intravenous fluids for the Syrian military. Of concern in this case are the manufacturing processes, which could be applied to a broad-range of CBW activities, and the end-user, which is the Syrian army. Vigorous intervention by the Simon Wiesenthal Center with Baxter director, G. Marshall Abbey,

caused the company to back off from this contract temporarily in 1991. However, it was subsequently reported that Baxter was attempting to complete the sale through the intermediary of an unknown supply house called Medport, located in Amhurst, Ohio.

Despite the attempts to attract private sector interest, the two largest pharmaceutical conglomerates in Syria, Thameco and DIMAS, remain under rigid state control. Together they control a third company, Saydalaya, which serves as the foreign procurement board for all Syrian imports of chemicals and processed medicines.¹⁰⁶ Thameco is controlled the Syrian Ministry of Industry and employs approximately 900 people at its principle production site in Damascus. A second plant, built in Aleppo at a cost of nearly \$40 million by a consortium of French pharmaceuticals companies in the late 1980s, was reportedly “abandoned” in 1989 because of financial difficulties. However, suspicion remains that Syria may have simply switched suppliers, in order to better disguise conversion of the plant to the production of CW agents.

DIMAS (the General Establishment for Blood and of Medical Industries) is directly controlled by the Syrian Ministry of Defense, and is the only manufacturer of serum of Syria. DIMAS is run by a General, Hikmat Tahrani. Its largest plant is located in Damascus.

CERS

The "lead agency" in Syria that handles research and development of both conventional and unconventional weapons is a government-run research institute known as CERS, according to converging intelligence sources in the U.S., Israel, and West Europe.

CERS is a French acronym (Centre d'Etudes et de Recherches Scientifiques) which Syrian delegations sometimes translate into English when they travel to Europe on procurement trips as the Scientific Research Council. (Other names used interchangeably

for CERS are the Scientific Studies and Research Council, the Syrian Scientific Research Council, and the abbreviations SSRC or SRC).

It was established in 1969 with help from the French government research agency, the CNRS (Centre Nationale de Recherche Scientifique), as a modest attempt at developing Western-style scientific research at Syrian universities. However, as Syria's interest in unconventional weapons grew, its charter was twice revised, in 1972 and in 1983, until CERS became the primary agency in charge of virtually all advanced state-sponsored technology research and development in Syria.

According to an official repertory of government institutions in the Middle East, CERS is engaged in research and engineering applications in the following areas: signal processing, telecommunications networks, Arabic-language computers, solar energy, the chemical and bacteriological pollution of rivers, sewage treatment and the construction of waste water treatment facilities, plastics, high performance lubricants and mechanical systems, and artificial intelligence. It is also the primary Syrian scientific agency handling cooperation with "Arab, regional, and international scientific institutions," and engages in feasibility studies for private and public organizations in Syria."¹⁰⁷

A closer look at CERS activities reveals a high proportion of military concerns: signal processing technology is the essential component of military radars and missile telemetry systems, for instance, while waste water treatment plants use similar technologies and equipment to CBW facilities. High performance lubricants, just to cite another example, are one of the few technologies still controlled by COCOM, because they are essential for the proper functioning of vacuum equipment, which is used for uranium enrichment and a variety of other sensitive industrial processes.

“We have been following the activities of the CERS for some time,” one senior U.S. government analyst said in an interview in Washington. “There is no doubt that this center is devoted to chemical weapons manufacture and related research projects.”

One European intelligence official monitoring Syrian unconventional weapons development went even further. "CERS is the primary research and development establishment in Syria, and has labs and production units spread across the country." While it attempts to operate under the guise of civilian technology developments, "nearly all its programs are military or military-related." Another European source placed CERS "under the direct control of the Syrian MoD." In fact, CERS is funded and reports directly to the Office of the President of the Syrian Arab Republic, General Hafez al Assad - a clear indication of its strategic importance.¹⁰⁸

During the mid-1980s, CERS solidified its arrangements with the CNRS in France, and sent scores of engineers for production training in France and elsewhere in a wide variety of disciplines, including electrical and mechanical engineering, metallurgy, and machining. These skills have a clear role in military manufacturing, as well as in nuclear weapons research and development. Providing technical assistance of this sort to Syria, a former French mandate under the League of Nations, was considered a legitimate means of maintaining dwindling French influence in a country to which the French continue to feel historical ties.

In 1983 and 1984, CERS was negotiating with France to purchase a tank maintenance and upgrade facility for the Syrian army, that would have allowed them to retrofit NATO-standard optics, fire control computers, and add-on reactive armor supplied by major French companies, including Sagem, to their Soviet-built T-72 tanks¹⁰⁹. "We had negotiated everything right down to the specific machine-tools needed on the factory floor," a senior French defense ministry official acknowledged in a private discussion. "But in the end, the government decided to put the deal on ice." The tank deal was revived in 1990 by pro-Arab French Defense Minister Jean-Pierre Chevènement, but appears to have been scuttled in early 1992 by his successor, Pierre Joxe.

In May 1986, CERS officially requested that the Société Nationale des Poudres et Explosifs (SNPE), the state-owned gunpowder and rocket propellant manufacturer in

France, "supply equipment and transfer production technology" worth 280 million French francs (\$30 million).¹¹⁰ SNPE would not comment on what the deal entailed, but other French industry sources said it was involved a munitions plant related to the tank deal. In 1987, another CERS request to France involved setting up a "micro-electronics laboratory" in Syria.

CERS also became the main procurement agency for Syria's unconventional weapons programs. Buying teams scoured Europe, the United States and Japan throughout the 1980s in search of "special technologies," and in some cases, to sign government to government research and technology transfer agreements.

The most recent of these agreements was negotiated by CERS with the Belgian government, in the field of "nuclear medicine." The agreement was signed on Friday, May 1, 1992 - normally a holiday in Belgium; because of this, it attracted no attention in the Belgian press. The Syrians reached Brussels at the end of a three-week European tour that had little to do with medical research; instead, they had been meeting with manufacturers of advanced electronic components in Britain, Germany, France, and Belgium.

In Germany, the Syrian procurement team signed agreements with AEG, a well-known defense electronics concern, and several other companies, including MFG, Mercateam, and Bayer. In France, discussions were held with Souriau to purchase electronic connectors, and with Deckel France, a subsidiary of Frederick Deckel of West Germany. (Frederick Deckel has been identified by the House Banking Committee in the United States for having performed two contracts, financed by the BNL bank in Atlanta, to supply DM 3 million worth of machine tools to Iraq which were used to produce parts of uranium enrichment centrifuges). Also on the CERS buying list in Europe were Hewlett Packard graphics terminals, which Iraq had purchased in large quantities for its weapons manufacturing programs. Attempts to purchase Hewlett Packard equipment by

CERS in the United States had all been rejected by the Department of Commerce, because of proliferation concerns.

CERS also appears to be coordinating Syria's recent attempts to build an industrial base for assembling, and later, manufacturing ballistic missiles on Syrian soil.

In recent years, CERS has been appearing more frequently under its English acronym, SSRC, perhaps in an attempt to disguise its past activities. This has not always led to success. In the United States, only one out of eight applications to sell licensed technology to SSRC has been approved since 1986 .

Licensing officials at the Federal Economics Office in Eschborn, Germany, said in interviews that while applications for sales of licensed goods to CERS/SSRC were still being approved, there was a high presumption of denial. "We look at this cases with a fine-toothed comb." However, German exports to the SSRC have been numerous in recent years, and have included large quantities of chemical manufacturing equipment, machine-tools, electronics, and a special steel plant. During the course of this investigation we have learned that some fifteen German companies had supplied hot isostatic presses and other high temperature ovens which are of use in producing solid rocket fuel and in manipulating fissile material. Germany export licensing officials said they were currently "reviewing the damage," and indicated that the print-out of cases involving German export sales to CERS over the past three years "fills two volumes."

The French government continues to encourage French high-tech companies to do business with CERS, going so far as to arrange meetings between French businessmen and CERS officials in Damascus, according to documents obtained from the "Office of Economic Expansion" at the French Embassy in Damascus. CERS also controls the Higher Institute for Applied Science and Technology (ISSAT), which is located in Damascus and run by Dr. Abdel Halim Mansour, the deputy director of CERS.

Ballistic missiles

Syria first discovered the strategic virtues of ballistic missiles during the opening battles of the October 1973 war, when it bombarded Israeli air fields with great success using its short-range FROG-7 missiles.

Replacement FROGs and longer-range Scud-B missiles were delivered by the Soviets after the war, and in 1983 Syria became the first foreign recipient of the SS-21 Scarab, the extremely accurate follow-on to the FROG-7. Syria currently has three active surface-to-surface missile brigades: one with 24 FROG-7 launchers, one with 24 mobile Scud-B launchers, and the third with 24 SS-21 launchers. A fourth brigade is now being formed as new SCUD-C missiles arrive from North Korea.¹¹¹

Encouraged perhaps by their success in obtaining the SS-21, the Syrians next tried to convince the Soviets to sell them the 900 kilometer-range Scaleboard SS-12, which was being phased out from the Soviet rocket forces by the INF agreement; and later, the more accurate, shorter-range SS-23. Moscow refused both requests, which were reiterated on several occasions in 1986 and 1987. "By July 1987, the Soviet Union had publicly stated that it was not going to supply Syria with SS-23s."¹¹² After perfunctory attempts to increase the range of its Scud-B missiles, which failed for lack of an adequate industrial infrastructure, Syria turned to China in 1988 and began negotiating the purchase of an all-new missile still under development, known as the M-9.

The Chinese M-9

The Chinese were developing the solid-fuel M-series missiles for export to the Third World, using Western technology they had acquired legally following the liberalization of COCOM controls on high technology exports to China in 1985. From this period on, the Chinese were using the hard currency proceeds from their own arms

exports to the Third World to finance imports of Western high technology, which were then funneled back into new weapons development. It was a remarkably cynical cycle, to which Western governments were willing partners.

The M-9 had nearly twice the range of the M-11, which was going into production into Iran, and was capable of hitting targets 560 km away. In 1988, reports that China was negotiating an M-9 sale to Syria elicited strong protest from the United States. Secretary of State George Shultz, followed by Defense Secretary Frank Carlucci, admonished the Chinese on these and other missile sales to Saudi Arabia and Iran during trips to successive trips to Beijing in July and September.

Notwithstanding these protests, China formalized an agreement to sell Syria 140 M-9 missiles on May 18, 1989 that was worth \$170 million. The deal was reportedly financed by Libya's Colonel Qaddafi, who wanted to keep 80 of the missiles for himself.¹¹³

The Bush Administration chose to publicly admonish the Chinese government over the M-9 sale, but was quick to accept Chinese assurances that no equipment had or would be shipped to Syria. Following the "secret" December 9-10, 1989 trip to China by National Security Advisor Brent Scowcroft and Undersecretary of State Lawrence Eagleburger (the first high-level visit by any Western officials to China after the Tienamen massacres of June), the Administration claimed that China had distanced itself from the Syria sale, and indeed, from all sales of "medium range missiles" to the Middle East.¹¹⁴ Nevertheless, reports continued to surface that China was pursuing the M-9 sale to Syria; and in September 1991 it was reported that two dozen M-9 tractor-erector-launchers (TELs) had been spotted in Syria by Western intelligence agencies.¹¹⁵

Part of the confusion over the M-9 sale to Syria, and the Chinese denials, appears to be the definition of the "medium-range missiles." China considers medium-range missiles to have a range of more than 1,000 kilometers, whereas the United States has consistently applied the MTCR guideline of 500 kilometers.

Beyond this, however, there has been a good deal of purposeful dissembling on the part of the Bush Administration. On June 12, 1991, for instance, Secretary of State James Baker testified before the Senate that the U.S. government had "no proof" that M-9 or other missiles had been sold by China to Syria. One week later, however, on the eve of a trip to Beijing to protest Chinese missiles sales to Syria, Pakistan and Iran, Undersecretary of State Reginald Bartholomew stated that China was "on the verge" of selling M-9 missiles to Syria.¹¹⁶ Given the state of the intelligence on the M-9 sale to Syria, Baker's insistence that the missiles had actually been delivered seems out of place.

On November 15, 1991, Secretary of State Baker went to Beijing to discuss Chinese sales of ballistic missiles and nuclear technologies to the Middle East, and came away announcing "clear gains in the fields of proliferation and trade" as a result of Administration pressure on the Chinese government. Specifically, Baker told reporters, this meant that China had agreed not to export the M-9 missile to Syria.

"One week later, if my information is correct," wrote *New York Times* columnist William Safire, "the Chinese agreed to help the Syrians to construct their own missile. This included the supply of Chinese equipment needed to assemble the advanced weaponry. The plot: China would live up to the letter of its agreement with the United States - holding back the Pershing-type M-9s - but violate its spirit by making it possible for Syria to deliver destruction in a locally produced missile of equivalent range."¹¹⁷

Senior administration analysts said in interviews in Washington that China had made a verbal pledge to Baker during his November 1991 trip to abide by the MTCR guidelines concerning the export of missile technologies, on condition that the United States lift sanctions imposed on two Chinese companies - China Great Wall Industry Corp, and China Precision Machinery Import-Export Corporation - previously identified as having negotiated ballistic missile sales to the Middle East. A written pledge was delivered by Chinese diplomats to the State Department on February 23, the officials said. This led to the lifting of the sanctions against the two companies one month later.

"Admittedly," a senior government analyst said in March, "this hasn't given us much time to test Chinese compliance. Still, our findings show that the Chinese have stopped delivery of these ballistic missile systems."

While they confirmed that China had yet to deliver M-9 missiles to Syria, a top Israeli government analyst suggested that technical problems could have contributed to the delay. "The Chinese are having problems refining the guidance system of the M-9 to its declared terminal accuracy of 600 meters, and have not yet fielded a production missile," this analyst said. "We cannot exclude the sale by China of production tooling and technical cooperation for local production of M-9 components."¹¹⁸

North Korean Scuds

Whatever the reason for the slow-down - pressure from the United States, or production problems - the M-9 contract had definitely run into snags by late 1989. This caused Syria to look elsewhere for rapid supplies of ballistic missiles. It would have preferred the solid-fuel M-9, which could be moved on their mobile launchers and prepared for firing in less than one hour. Lacking them, Syria turned to North Korea, China's alter ego when it came to weapons supplies, and the chosen partner for ballistic missile development of Syria's strategic partner, Iran. Syria put out feelers to acquire the liquid-fuel Scud-C, which were quickly met with an affirmative reply.

On March 29, 1990, North Korean Vice President Yi Chong-ok traveled to Damascus, to sign a scientific and technical cooperation agreement between the two countries¹¹⁹. Such agreements, which in the past usually disguised conventional arms sales, have increasingly been used to camouflage technology transfer. Syria, like Iran, had decided that it needed to develop an indigenous ballistic missile manufacturing capability, to put it beyond the reach of the United States or other powers, who might seek to limit its independence by blocking its attempts to purchase the weapons it felt

necessary for its own defense. (It should be recalled that the Soviets had also played the denial game, by turning down Syrian requests to buy the SS-12 and SS-23 missiles in the late 1980s).

The first shipment of North Korean Scud-Cs arrived in kit form in the Syrian port of Latakia in early March 1991, one year after the agreement was signed, on board a Jordanian-Syrian freighter, *Al-Yarmouk*. To avoid detection, the North Koreans had plotted a circuitous route, refueling in Madagascar, then traveling around the Cape of Good Hope, through Gibraltar into the Mediterranean. Yarmouk eventually sailed into the Syrian port of Latakia, right under the noses of U.S. (and Israeli) warships.¹²⁰ In June, a second shipment of approximately 30 missiles, also in kit form, was delivered along the same route.¹²¹

The Gulf War was just ending, and attentions were focused elsewhere than on the delivery of a few shiploads of missile parts to Syria. Besides, the Syrian purchases were being paid for by Saudi Arabia, which had just paid a \$2 billion reward to Syria for having sent troops to fight Saddam Hussein. Most sources we interviewed estimated the total North Korean missile package to have cost around \$500 million, or one-quarter of the Saudi payment. This is in line with similar purchasing patterns in the 1970s, when Syria used Gulf Arab aid to fuel an earlier arms build-up.¹²²

A third shipment of Scud-C missiles, including the long-awaited launchers, headed for Syria in September 1991. Apparently the North Koreans were hoping that the two earlier deliveries had cleared any U.S. or Israeli opposition to the sales, and tried to steam directly up the African coast and into the Suez Canal, a more direct - and less costly - route. But leaks to the Israeli press in early October identified the ship, the *Mupo*, and its cargo, and warned that the Israeli navy was closely tracking its progress. After an extended layover in Madagascar, during which an attempt may have been made to transfer the missile and TEL assemblies onto another ship, the *Mupo* turned back to North Korea. Its cargo was delivered in March 1992 to the Iranian port of Bandar Abbas,

when a highly-publicized attempt by the U.S. Navy to block the arrival of two North Korean freighters laden with missile parts ended in fiasco. Iran quietly airlifted the missile parts to Syria in May.¹²³

As part of the \$500 million deal, North Korea was building two industrial facilities in Syria. The first, near Aleppo, was intended to be the main missile assembly plant, which was being built largely underground. A second plant, under construction outside Hama (where Rifaat al Assad massacred some 20,000 Muslim Brothers in 1982), will be used to produce guidance kits and rocket fuel. While North Korea is in charge of the project, Syrian technicians from the Aleppo and Hama plants were sent to China in 1991 for technical training.¹²⁴ China may also be supplying guidance technology to improve the terminal accuracy of the Scud-C.

To equip the new missile and electronics plants, the Syrians have begun purchasing equipment from around the world, turning increasingly to companies in Asia, since, as one Israeli analyst put it, "the United States and West Europe have begun to learn the procurement lesson from Iraq and have become more wary of dual-use sales." The most willing technology partners appear to be Singapore, Hong Kong, Taiwan, and Japan, which was repeatedly singled out by export control officials in Europe and the United States as particularly unwilling to enforce proliferation controls.

"Syria's intention is to go beyond assembling these missiles to actual manufacture, and this is the real danger," the analyst said. "Our worry is that once they have the industrial infrastructure, they can improve range themselves, add a CW warhead, improve the HE warhead - and all without foreign help."

In addition to the two missile assembly plants, Syria is also building industrial facilities to be able to manufacture liquid rocket fuel. This requires liquid nitrogen, kerosene, and compressed air - all three of which are readily available as byproducts of standard petrochemicals processes. Syria has spent heavily over the past three to four years building up its petrochemicals industry, so this technology can be considered to be

already present in country. This is yet one more instance where unconventional weapons technologies remain freely available on the world market, despite the various lists of items subject to export controls.

Nuclear long shot

Syria is not considered to be on the verge of going nuclear, or even anywhere close. However, it has maintained a modest nuclear research program over the years, training technicians abroad and acquiring some basic nuclear infrastructure, for the day a political decision and an economic commitment are made to pursue nuclear weapons development in a more active mode.

Syria has taken several steps in this direction over the past three years. The United States expressed quiet concern about Syria's nuclear intentions for the first time in Sept. 1991, when a senior analyst from the State Department's Arms Control and Disarmament Agency listed Syria among those countries having "nuclear programs with suspicious intentions."¹²⁵

In early 1989, Syria began discussing the purchase of a nuclear research reactor with the government of President Raul Alfonsin of Argentina, only weeks before general elections swept the Opposition Peronist party to power on May 14. Under the leadership of Carlos Menem, Argentina announced in May 1990 that it had "practically concluded negotiations" with Syria for the sale of a 10 megawatt isotope production reactor and related facilities, worth an estimated \$100 million.

The President of Argentina's Comision Nacional de Energia Atomica (CNEA), Manuel Mondino, revealed that CNEA would supply uranium hexafluoride enriched to 20% in Argentina's unsafeguarded enrichment plant as a basis for the reactor fuel. CNEA would act as project manager, with plant conception and engineering works carried out in a partnership with Investigaciones Aplicadas (Invap). The new Syrian nuclear center

would include a radiological protection center and a hot cell for radioisotope production. A major training package that included the handling of radioactive materials (necessary for plutonium production) was also included. CNEA did not say where the new reactor complex was to be built.¹²⁶

In normal cases of reactor sales, both seller and purchaser are expected to inform the IAEA of the proposed transfer and to negotiate a safeguards agreement, to ensure there is no diversion of nuclear material or equipment to an undeclared weapons program. In this case, however, the IAEA says it “never received any notification from either party and has “no information” as to the final status of the deal.

However, it appears that quiet pressure from the United States led the Argentines to cancel the arrangement later that year, for fear the reactor could be used to produce plutonium. “Syria’s attempt to purchase such a reactor was indicative of their nuclear intentions,” U.S. officials said.¹²⁷

Undeterred by the rebuff Syria turned to China, and on Nov. 28, 1991 signed an agreement to purchase a far more modest 30 kilowatt miniature neutron reactor. This reactor was billed as a pure research project, intended for use in neutron activation analysis. However, a British nuclear expert, John Large, took exception to the official view. “They will be using highly enriched fuels such as uranium and plutonium,” he was quoted as saying by the Times of London. “These can be used to create the isotopes used in nuclear weapons. Although the reactor may sound small and only capable of lighting a few light bulbs, it is not size which counts, rather the amounts of fuel that are used.”¹²⁸

In Israel, senior defense ministry officials expressed concern over the proposed reactor deal with China. “It is very regrettable to see that the world still has not learned the size of the danger in providing a nuclear reactor and know-how to countries run by totalitarian dictators.”¹²⁹ To fuel the reactor, Syria was requesting to purchase 980.4 grams of highly enriched uranium. While this is an insignificant quantity as far as nuclear weapons production is concerned, Syrian technicians would have to be trained in how to

handle highly-radioactive and toxic substances, skills absolutely essential to designing and making a bomb.

When the case was put to the IAEA Board in Vienna in December, Syria raised additional suspicions as to its nuclear intentions when it refused to accept a fullscope safeguards agreement that would have placed all Syrian nuclear facilities under IAEA control, not just the Chinese reactor. “We can only surmise that the Syrians did this as a matter of principle,” said IAEA spokesman David Kyd, “since we are not aware that Syria has any other facilities that would come under a comprehensive safeguards agreement.”

Whatever Syria’s reason for refusing a safeguards agreement - political, or military - the IAEA board took the unusual step of disapproving the sale. Western delegates at the IAEA expressed concern that by training Syrian scientists in their nuclear labs China might “jump start” a nuclear weapons development program in Syria.¹³⁰

Meanwhile, Syria was reported to have signed a strategic cooperation agreement with Iran, that included the establishment of joint Syrian-Iranian working committees on nuclear weapons development and strategy. The treaty was reportedly ready for signing on Oct. 12, 1991 - just before the reactor deal was announced - but was postponed because of the Middle East peace talks that opened in Madrid at the end of the month. It was finally signed sometime in January 1992, as reports intensified that Iran had acquired nuclear warheads from Kazakhstan.¹³¹

IAEA Director General Hans Blix took the road to Damascus on Feb. 6, 1992, in an attempt to convince the Syrians that it was in their interest to accept fullscope safeguards, to dispel any doubts that they might have embarked on a clandestine nuclear weapons program. Blix met with the Director of Syria’s Atomic Agency Authority, Dr. Ibrahim Haddad (who also doubles as the number two of Syria’s permanent delegation to the IAEA in Vienna), and with Foreign Minister Farouk al-Shara. If Syria were to accept IAEA safeguards, Blix said, this would open the way to cooperation between Syria and

industrial nuclear nations in the areas of nuclear power, nuclear medicine, agriculture, industry, and scientific research.¹³² Blix also told the Syrians that they would make a better contribution to Middle East peace efforts by agreeing to comprehensive IAEA inspections. "This might constitute pressure on Israel of another kind an isolate it in the eyes of world public opinion for not signing the safeguards pact," he declared in Damascus..¹³³

Blix's arguments apparently convinced the Syrian government, which officially agreed to full scope safeguards of all its nuclear facilities in February 1992. By June, however, Syria had still not submitted a list of facilities to the IAEA. "Until the Chinese reactor is installed," Agency sources said, "we consider that Syria has nothing to declare."

While the IAEA has no other legal course available to it, this leaves the door open to wide scale abuse. Indeed, the Iraqi example suggests at least three possible avenues of skirting the IAEA controls that Syria may have taken in recent years: purchases of nuclear materials on the black market (ie, uranium yellowcake from South Africa, Niger, or Brazil); the construction of clandestine enrichment facilities and design labs using advanced technology and manufacturing tools imported legally from Germany, France, and the United States; and the installation of a uranium processing line at the very large super-phosphate complex in Palmyra, now under construction by a consortium of European firms, which would give Syria an unsafeguarded supply of natural uranium.¹³⁴

Further obscuring Syria's nuclear intentions was a curious 1987 purchase in the United States of a large scale computerized control system from the Brown Boveri Company, with the stated end-use of serving a "nuclear power station" in Syria. According to the IAEA, Syria has no such facilities.

It remains unknown whether this purchase was a fluke, or whether it is part of a larger procurement pattern aimed at equipping a clandestine nuclear facility in Syria.

Purchases from the U.S.

Despite Syria's inclusion in the list of countries supporting international terrorism, its direct role in the attempted bombing of an El Al airliner in London in 1986, and its complicity in the holding of American and other Western hostages in Lebanon by pro-Iranian groups, Syria continued to receive American high-technology under the Reagan and Bush presidencies, although the dollar amounts were far inferior to what Iran or Iraq was getting approved routinely by the Department of Commerce during the same period.

From 1987 through September 1991 some 133 licenses were granted for Syria by the Department of Commerce, for goods worth a total of \$21,892,987. Total applications concerned \$95,491,786 worth of goods in 311 separate applications, of which 42.7% were approved.

This high rejection rate certainly discouraged the Syrians, who turned to Germany and France for their large-scale purchases of high-technology goods.

Nevertheless, a few particulars involving purchases from the United States are worth pointing out:

- During this period, the Department of Commerce approved 7 licenses for the Syrian Atomic Energy Commission, and 1 license for the State Establishment of Electricity (the computerized control system mentioned above), worth a total of \$344,419. Four other licenses were rejected.

- Only 5 licenses, worth \$966,066, were approved that had a clear potential end-use for the manufacture of chemical or biological weapons. This flatly contradicts widespread assertions made to us in Germany and France that U.S. firms had shipped CW precursors to Syria during this period, although it does not exclude the possibility of earlier shipments, before such chemicals were controlled. Only one of the five licenses involved bacteria strains; the others were computer equipment. Five other licenses were rejected.

- The Department of Commerce effectively blocked a 1987 attempt by the Syrian Ministry of Interior to upgrade its intelligence gathering and analysis center in Damascus, using VAX computers purchased through International Computer Systems Ltd, a licensed distributor of Digital Equipment Corp and a large exporter to Iraq.

- The Department of Commerce successfully identified Syria's most important procurement front, CERS (alias the Syrian Scientific Research Council, alias the Scientific Studies & Research Center), and denied all seven license applications put in during the period studied. One license, to the Higher Institute of Science & Technology - an emanation of CERS - was approved in 1987.

- By far the most significant technologies sold to Syria - in terms of dollar value, sophistication, and number of licenses - involved equipment declared for use in oil field exploration and logging in northern Syria. Such equipment involved fully one-third of all license applications during the period under study (107 out of 311), and constituted the majority of equipment actually approved for sale to Syria (62 approved licenses, worth \$11,896,869).

Oil well logging equipment is intrinsically dual-use. The equipment used to detect underground oil deposits and to carry out seismic analysis has direct application to nuclear weapons research and development; indeed, the engineers who handle such research for the major oil well logging companies are almost exclusively nuclear physicists. High-power neutron generators, with a similar design to those used to trigger a nuclear explosion, are used in oil exploration to detect underground oil deposits, by mapping or "logging" the geological strata of a given area. In order to analysis test results, high-powered computers are needed, as are secure microwave communications.

While all of this equipment has a clear, direct, and immediate application to a nuclear weapons program, so far there is no reason to believe that Syria has succeeded in diverting equipment licensed for legitimate oil well logging projects to a clandestine weapons program. The major loggers present in Syria and purchasing this equipment in

the U.S. have, in most cases, retained control over the most sensitive instruments and computers, whereas in the case of Iraq they transferred the equipment to an Iraqi state entity.

On the whole, it appears that the export licensing mechanism in the U.S. has worked well until now in the case of Syria. However, reticence toward Syria appears to be ending as the regime of Hafez al Assad opens up to foreign investment, and has acquired international legitimacy for its participation in Operation Desert Storm.

One major U.S. arms exporter applied to ship \$12 million worth of military hardware to Syria in late 1991, to upgrade a squadron of Czechoslovak L-39 “Albatross” trainers in service with the Syrian Air Force. (This license was still pending at the time of our data). Approval of this sale would send a loud message to Damascus and to American competitors in Europe that Syria had become a legitimate partner for Western business, and could open the door to wide scale abuse, such as seen in Iraq.

U.S. Export Licenses approved for Syria

<u>Year</u>	<u>Total applications</u>	<u>Approved</u>	<u>Value approved</u>
1987	68	28	\$3,497,752
1988	77	53	\$10,147,244
1989	55	24	\$5,195,703
1990	67	23	\$2,869,656
1991 (9 months)	33	5	\$182,632
1991 (pending):	-	14	\$17,441,249

IV. Libya

Overview

The threat posed by Colonel Qaddafi's "green" dictatorship has been systematically over-rated by successive U.S. governments. While it is true that Libyan purchases of conventional weaponry from the Soviet Union and France reached very high levels in the late 1970s and early 1980s, many of the sophisticated jet fighters, missiles, and tanks Qaddafi bought were never taken out of their shipping crates. When Libyan forces were confronted by ill-equipped but highly-motivated Chadian forces in the Aouzou strip between their two countries in 1987, they suffered repeated and highly embarrassing defeats. As a conventional military threat, Libya is virtually non-existent.

However, Libya's oil wealth, and Colonel Qaddafi's demonstrated willingness to back international terrorist movements, has won him a special role as a purveyor of unconventional weapons and weapons technologies.

Seen in this context, Libya's persistent efforts to acquire nuclear weapons, the construction of a very large chemical weapons facility at Rabta, and its acquisition of medium-range ballistic missiles takes on new significance, since Colonel Qaddafi could be tempted to use these weapons in an unprovoked or pre-emptive attack or could transfer them to larger states such as Syria, Iraq, or Iran. Left to its own devices, and under a rational leadership, Libya with its three million population does not pose a strategic threat to any state. Under the stewardship of the erratic Colonel Qaddafi, however, Libya has become the object of international sanctions.

Chemical Weapons

In the mid to late 1980s, Libya built a very large chemical weapons facility at Rabta, ostensibly to produce pharmaceuticals. Despite repeated warnings starting in 1984 that German firms were spearheading the Libyan effort, the government of German Chancellor Helmut Kohl refused to take any steps to prevent the transfer of chemical weapons precursors, technology, or production equipment to Libya. Worse, when confronted publicly with this failure by orchestrated leaks in the American news media in late 1988 and early 1989, Chancellor Kohl repeatedly and indignantly denied that German firms had any involvement whatsoever in the construction of the plant, or that the German government had been aware of such activity. This led one U.S. commentator, William Safire, to refer to Rabta as “Auschwitz in the Sand,” and prompted a wave of criticism against lax West German export controls.

Only one month after Chancellor Kohl most vehement denials, a top intelligence aide, Wolfgang Schauble, presented a confidential report to the Bundestag that showed in excruciating detail the total contempt high-level German officials felt for any constraints on the exports of German companies, and their total lack of concern that Germany could be seen, forty years after the Holocaust, as the purveyor of poison gas to dictatorial regimes in the Middle East. The Schauble Report included a detailed chronology of what the various West German intelligence services knew about the Libyan poison gas project as early as April 1980, and proved that Imhausen-Chemie had been clearly identified as the principle contractor for Rabta as of July 5, 1985. Although the Schauble report attempted to disculpate the West German government, it was a stirring exposé of the kind of willful blindness that has characterized German attitudes toward the export of strategic technologies for years to Third World nations for years. We reproduced the Schauble Report in extenso in *The Poison Gas Connection*.

Major Japanese steel companies and equipment manufacturers were also deeply involved in the Rabta project. Exactly what the Japanese government knew about the real nature of the “Pharma 150” plant at Rabta has never been revealed. However, Japanese companies succeeded in getting off the political hook - where their German counterparts failed miserably - by claiming that they believed Rabta was a legitimate civilian project.

Beyond Rabta

In early March 1990, the State Department announced that Rabta had begun production of chemical weapons, with an output of some 30 tons of mustard gas and again as much of the nerve gas sarin in 1989.¹³⁵ When asked what steps the United States was contemplating in response, State Department spokesmen pointedly refused to rule out military action.

These hints of U.S. military action had an immediate affect in Tripoli. On March 14, 1990, press reports originating in Washington said that a major fire had broken out at Rabta over the weekend, devastating the plant and rendering it inoperable. Libya hastened to accuse the U.S. of sabotage. By May, however, the Libyan government switched guns, and detained two West German citizens from the Otto Kay company, alleging that they were responsible for the arson. Meanwhile, commercial satellite photographs showed that the huge smoke screen hanging over Rabta had been generated by piles of burning tires, which had left no trace of fire damage to any of the main production buildings. The U.S. government concluded that the Libyan authorities had purposefully set the fire as a means of forestalling an American air strike against the plant.

The smoke screen had a second purpose, according to Chancellor Kohl's senior aide in charge of intelligence, Lutz Stavenhagen. During a visit to Israel on May 13, 1990, Stavenhagen told reporters that there was "reason to believe that a second plant similar to Rabta is being planned" in Libya, perhaps using production equipment spirited out of the Rabta facility during the fire. The new plant was being built underground to avoid satellite reconnaissance, on the grounds of the former Otrag missile proving grounds at Sebha, 650 km south of Tripoli. Once again, according to reports in *Der Spiegel*, German companies were involved in the construction work. However, during his

trip to Israel Lutz Stavenhage insisted that Bonn had intervened "to cut that part out in which German companies have been involved."

The Libyan News Agency, JANA, vehemently denied the existence of a CW plant at Sebha, and warned that "such allegations could not be separated from the hostile campaign waged by circles hostile to the Arab nation and its technological and scientific progress." However, an investigation by reporters from Granada television in Britain discovered contractual evidence showing that a German intermediary based near Stuttgart, Hans Joachim Rose, was actively engaged in attempts to purchase large computer systems from Siemens for controlling CW production at the new Sebha facility.¹³⁶

Despite efforts to "clean up" the Rabta plant to give it the appearance of a civilian chemicals plant, Gates told Congress that the Libyans "have yet to reconfigure the plant to make it incapable of producing chemical agents."¹³⁷ He and other intelligence officials said that Libya was also working to build a biological weapons capability, but "had not progressed very far" toward this goal.

Germany took major steps toward improving its export control system in late 1991 and early 1992, initially to prevent further deliveries to Libya's chemical weapons programs, and later on, to prevent deliveries of missile technology and nuclear-capable equipment. As for Hans Joachim Rose, he is now under investigation by the Stuttgart public prosecutor for his activities on behalf of Libya.

Ballistic Missiles

Libya purchased 72 Scud-B launchers and hundreds of missiles from the former Soviet Union in the 1970s and 1980s, but has never successfully used them in combat. In 1985, in a gesture of solidarity with Iran, Libya shipped a small number of Scuds to Iran, which were promptly fired into Iraq during the first installment of the War of the Cities

that year. In 1986, in retaliation for the US air strikes against Tripoli and Benghazi, Libya fired two Scuds northward across the Mediterranean, in an attempt to hit a U.S. military base on Lampedusa island off the coast Italy. Lacking the necessary range, both missiles fell short of their target into the sea.

Since then, Libya has been trying to purchase longer-range missiles to extend its military reach across the eastern Mediterranean, to reach Italy and France - both of which have a proven track record of caving in to terrorist threats - as well as Israel. In an interview with Granada television's "World In Action" program in early 1991, Qaddafi explained that it was Libya's right to deploy weapons of mass destruction. "If we had had missiles in 1986 when [the Americans' hit Tripoli and Benghazi, we would have used them against Washington, New York and London."¹³⁸

Negotiations were under way in early 1992 with North Korea, to purchase the No-Dong 1, which the DPRK is developing with Iranian funds. U.S. Intelligence officials tracking the talks say the No-Dong 1 is a SCUD derivative using liquid fuel, with an estimated range of 1,000 km.

A Libyan purchase of ready-made missiles from North Korea comes in addition to ongoing research, conducted primarily by German engineers, to develop an "indigenous" long-range multiple rocket-launch system, capable of hitting targets at distances of 200 km. Libya's rocket program was established in the 1970s by a German consortium of former MBB engineers known as Orbital Transport und Raketen AG OTRAG. Libya recently renamed the rocket the Al Fatah.

The Otrag Saga

Lutz Tilo Kayser was 34 years old when he set up Orbital Transport und Raketen-Aktiengesellschaft, better known as OTRAG - in 1974. A former engineer with Germany's world famous Messerschmidt Bolkow Blohm company in Munich, Kayser

had become friends with former Nazi rocket scientists Wolfgang Piltz and Kurt Debus in the early 1970s, and was determined to revive Germany's lead in ballistic engineering, even if it meant collaboration with Third World dictators.¹³⁹

Otrag established a technical office in Stuttgart, and a rocket experimental facility and test lab in Garching, near MBB headquarters in Munich. Early on, Otrag received development grants from the West German Defense Ministry's R&D office, DFVLR, and set up a joint facility with DFVLR in Lampoldshausen called the Institute for Chemical Rocket Propellant, or DFVLR-TF Treibwerk. Otrag and Lampoldshausen were the only establishments in all of Germany doing rocket fuel research. It was a top secret program, since West Germany was not then supposed to be working on any ballistic missile projects.¹⁴⁰

In 1976, Otrag signed a contract with the West German government which authorized it to develop a family of ballistic missiles as a private venture. The agreement gave Otrag the right to establish its own rocket test site, as long as it was located outside of Germany. In March, 1976 Otrag negotiated the lease of a huge, 100,000 square kilometer test site in Zaire.

Otrag's ambition was to build a family of rockets using relatively cheap, off-the-shelf components. By configuring their basic booster in different ways, Otrag engineers boasted that they could make everything from artillery rockets to satellite launch vehicles, depending on how many boosters were strapped together. Otrag was negotiating in the late 1970s with the Arab league to win a contract to launch the Arab communications satellite known as Arcomsat.¹⁴¹

Following intense U.S. pressure on the Mobutu government, and exposure in the German press, Otrag was forced to leave Zaire in April 1979. But Lutz Kayser had already foreseen his next step. Sometime in 1978, Kayser had received a discreet visit in Kinshasa from Abdel Mashed al Gand, a personal advisor to Colonel Qaddafi who went on to become Libya's Minister of Energy¹⁴². Gand invited Kayser to move his company

lock stock and barrel to Libya. By October 1980, Otrag had set up shop in "an immense natural basin, bounded on the south by the Fezzan plateau and on the north by the Djebel al Sawda, a low range of mountains above Sebha."¹⁴³

The first Otrag rocket was launched successfully from Sebha on March 1, 1981. Encouraged by this success, Otrag began marketing a small satellite launcher "from our rocket family" capable of carrying payloads of 100 kg to 400 kg into low earth orbit. A second test-launch, in May, ended in failure.

Meanwhile, a state-controlled Swedish defense electronics firm, Telub, began training Libyan military technicians in Sweden starting in 1977. Telub was owned by Sweden's second largest munitions manufacturing, FFV, and is now part of the Swedish Ordnance group, which is jointly owned by FFV and Bofors.

Sweden had negotiated a treaty of friendship and cooperation with Libya in 1974 in hopes of skirting the Arab oil boycott that followed the October 1973 Arab-Israeli war. Part of the treaty involved the training of Libyan military technicians in Sweden, and the dispatch of Swedish military electronics instructors to Libya. The instructors were sent to Libya by an independent consulting firm called Teleplan.¹⁴⁴ The Libyans went to Sweden disguised as "boy scouts." In fact, they were studying missile telemetry.

According to John Cooley's account, U.S. intelligence zeroed in on the Otrag project in the summer of 1981. By September, U.S. intelligence officials said they had "new evidence that Otrag might be using its tests in Libya to hide efforts to sell military technology not only to Libya but to Pakistan, Iraq, and other countries." By December, Otrag announced that it would cease operations in Libya in early 1982, moving to an undisclosed new country. From then on, the trace goes cold.

In fact, it now appears that Otrag never left Libya at all. Instead, they shifted ownership and operations to a series of front companies established by Otrag executives in Sardinia, France, Liechtenstein, and Austria, to prevent further embarrassment to the West German government.

Through all of it, however, Otrag kept its foothold in West Germany. Offices were maintained in Stuttgart and Munich, which continued Otrag's research into advanced rocket propellants. One of Otrag's old Libya hands, Walter Zielger, took over as general manager of a Munich-based satellite technology company, Globosat Satelliten-technik GmbH, which had major contracts in Libya. Otrag itself only disappeared from the commercial registry in Garching on November 4, 1987, well after the enactment of the MTCR that should have put a stop once and for all to Otrag's activities. A German Customs investigation concluded in 1989 that Otrag "had broken no laws" and was therefore "not subject to prosecution" under existing German export control laws. "We continue to keep an eye on Otrag and four of its principle suppliers," German government officials said in interviews. "But the names are changing and the old companies have been replaced by successor companies. It's all in a fog, so it is difficult to say with any certainty what exactly is going on."

It now appears that Otrag received additional German government development grants well after it announced the end of its Libyan projects, to continue work on ballistic missiles which, officially, did not exist.

According to Eckhard Fischer, who heads the SPD research unit on weapons and technology transfer at the German Bundestag, up until quite recently the West German government was allowing - even encouraging - private German companies to pursue research into unconventional weapons technologies as a means of keeping German industry competitive with its European partners.

This was especially true of missile programs. Unlike France and Britain, which had advanced ballistic missile programs as part of their nuclear deterrent, and Italy, which became a major supplier of rocket propellants, Germany had no government-sponsored missile programs to keep its research establishment alive. "If Germany wanted to earn a place within Arianespace," the multi-billion dollar effort to develop a European space launch vehicle, "then it needed to sponsor private missile ventures such as Otrag in order

to maintain a technology base," Fischer said. "German companies such as MBB were arguing that without a German national missile program they had to export in order to stay competitive and to develop these technologies. We simply did not have the domestic market."¹⁴⁵

Fischer said that the same logic was used by representatives of the chemicals industry, and by such large industrial conglomerates as Siemens, which wanted to develop jet nozzle uranium enrichment techniques but had no mandate to do so inside Germany. "When these technologies were considered necessary in terms of economic competitiveness," Fischer said, "the big companies sought to develop them, with the approval of the Bonn government, through export contracts."

Fritz Werner, Leybold, and Al-Fatah

Otrag appears to have gone to ground in the mid-1980s, just as the West German Customs Criminological Institute (ZKI) was launching its investigation into the company's activities. On Nov. 8, 1987, a tactical surface-to-surface rocket was test-fired from the Otrag firing range in Sebha, according to Western and Egyptian intelligence sources. It has never been established with certainty whether this test actually involved a West German missile prototype, a long-range artillery rocket, or simply a Soviet-built Scud.¹⁴⁶

Also in November 1987, as mentioned above, Otrag officially closed its German headquarters. Were the two events linked? Was Otrag deliberately seeking a low profile in Germany to disguise the revival of its missile programs in Libya? "Lutz Kayser and the other main players at Otrag have not been heard of since the early 1980s," German officials following the Otrag case acknowledged. "We suppose they're out there somewhere."

Wilhelm Dietl, a West German investigative journalist who did extensive work on Otrag and its web of support companies, says he discovered one of the Otrag men in Tripoli, Libya, in 1990. "Dr Toukhandler was living in a very large, and heavily-guarded villa in Tripoli," Dietl said. "He refused to be interviewed."¹⁴⁷

The next events that come onto the scope involve a series of sensitive exports to Libya from German companies that were blocked in 1991. These sales all involved equipment destined for a Libyan long-range artillery rocket which soon became known in intelligence circles as the "Al Fatah" program. In fact, however, sources in Washington and Tel Aviv agreed, the al Fatah program is merely the extension and direct continuation of the Otrag project. "It's the same people, and the same companies, all over again," one source commented.

In July 1991, German customs agents in Hamburg were tipped off by their American colleagues to watch out for a Libyan freighter, the *Jarif*, believed to be carrying special tools bound for the Libyan missile program. The tip proved to be correct. In addition to machine-tools which could be used for manufacturing missile parts, the Customs agents found contractual documents that referred to the cargo as destined for "a plant for the manufacture of pipes for sewers and aqueducts" that was to be built by Fritz Werner GmbH of Obendorf.¹⁴⁸ (The Iraqis had used a similar ploy to buy extremely large turning machines from the United States, to manufacture barrel segments for Gerald Bull's super-gun). A few weeks later, a second shipment from Fritz Werner was blocked in the nearby port of Bremerhaven. The al Fatah rocket plant was said to be located at a new site out in the desert, some 130 km south of Tripoli.¹⁴⁹

German security technicians who had been on the site told the Italian daily *Corriera della Sera* that the al Fatah plant was heavily guarded. Meanwhile, France continued to provide advanced military electronics to Libya, and may have provided missile guidance equipment, while Libyan technicians received training in defense electronics systems at a special center outside Paris run by Thomson-CSF.¹⁵⁰

In November 1991, the Defense Technology Security Agency informed the German government that a "domestic" German sale of special high-temperature furnaces was on its way to the Central Repair Workshop in Tripoli, Libya, one of the procurement fronts most frequently used for the Al Fatah program. The furnaces had been manufactured by the German company Leybold AG, and had ostensibly been sold to Leybold's former partner, W.C. Heraeus. Both were familiar names to non-proliferation experts for having provided sophisticated vacuum equipment and high-temperature furnaces to Iraq, Iran, North Korea, Pakistan, and India. This equipment could be used in the production of nuclear weapons and ballistic missiles.

The furnaces were finally traced to a warehouse in the Dutch port of Rotterdam, where they were finally impounded in November 1991 with the help of Customs agents from Holland and the U.S. The case proved embarrassing to the German government since it had no statute on its books that would allow it to legally block the export of the furnaces. So in an extraordinary measure, the equipment was put on a "one-time" emergency control list. Later, the German government strengthened its export licensing laws to enable it to stop this type of equipment from reaching countries of proliferation concern. The new measures became known in industry and among export control officials as "the Leybold law," in honor of this particular case.

A fourth shipment for the al Fatah program, this time involving U.S. origin laser equipment and controlling software for the Fritz Werner machine tools, was blocked at Frankfurt airport with the help of German customs. The equipment had been purchased in the U.S. by a front company in Holland called Eurabic, and was transiting through Frankfurt airport on its way to Libya. Acting on information again provided by DTSA, German Customs agents managed to stop the plane carrying the equipment after it had been cleared for takeoff at Frankfurt airport. In 1989, the same company allegedly sold CW precursors to Libya purchased in Germany, pretending they were to be shipped to

Algeria. The chemicals were eventually rerouted to the Technology Center in Tripoli, Libya, a known procurement front for the Libyan CW program.¹⁵¹

Nuclear Weapons Development

Colonel Qaddafi has never hidden his desire to acquire nuclear weapons, and has sunk large sums of money into a variety of schemes to purchase fissile materials and nuclear-capable missiles from black market vendors. Less than a year after seizing power in 1969, he sent his second in command, Major Abdelsalam Jalloud, on a series of clandestine trips to China, in an attempt to purchase a complete atomic weapon, but the Chinese refused.¹⁵²

He has also pursued more open nuclear contacts. In 1972 Libya began negotiations with the Soviet Union to purchase a 10 MW nuclear research reactor, all the while hiring the Belgian nuclear export agency, Belgonucléaire, as a consultant for the deal. The Soviets agreed to build the reactor and a modest nuclear research center at Tajjura, outside Tripoli, that began operating in 1981. In the meantime, Qaddafi continued negotiating with the Soviets, Belgians and the French to buy a pair of 440 MW power reactors, which he intended to construct in the Gulf of Sirte. Despite heavy lobbying by the French, including a state visit to Libya by French Prime Minister Jacques Chirac, these plants were never built.¹⁵³

In 1973, Libya and Pakistan sealed a pact during secret meetings in Paris, to build an "Islamic Bomb" using Pakistani expertise and Libyan petrodollars. It has never been established what nuclear technology, if any, Libya managed to get for the several hundred million dollars it is known to have invested in Pakistan's nuclear weapons research. Shortly after the October 1973 meeting in Paris, Libya tried to purchase twenty calutrons to enrich uranium from Thomson-CSF, a deal that appears to have been fully supported by top company officials but was finally blocked by the French government,

because of the obvious use of enrichment technology to an undeclared weapons program.¹⁵⁴

To better disguise its nuclear intentions, Libya agreed to sign the Non Proliferation Treaty in 1975. However, it would not ratify the treaty or negotiate a safeguards agreement for more than five years. This allowed Libya to purchase several hundred tons of natural uranium from the French-controlled mines in neighboring Niger, without subjecting the material to IAEA safeguards. (Some sources believe Libya purchased more than 1200 tons of yellowcake from Niger)¹⁵⁵. Meanwhile, secret Libyan government emissaries traveled to India in 1978 in an attempt to buy the bomb, just as they had done previously in China. At one point, according to India's ambassador to the United States, the Libyans offered to pay off India's entire foreign debt (then estimated at more than \$15 billion!) in return for a nuclear device.¹⁵⁶ Such an attempt suggests that there may have been problems with Libya's ongoing nuclear cooperation deal with Pakistan.

In 1982, Libya turned to Belgonucléaire again, this time to purchase a plant for manufacturing uranium tetra fluoride. According to the Carnegie Endowment's Leonard Spector, the only feasible use for such a plant would be to produce uranium hexafluoride, the feed stock needed for the centrifuge uranium enrichment program then underway in Pakistan. (Libya had no declared nuclear facilities that would have required uranium tetra fluoride). Under pressure from the United States, Belgium shelved the deal in 1985.¹⁵⁷

Meanwhile, Libya nearly succeeded in purchasing a "hot cell" to reprocess plutonium from spent reactor fuel from the Italian subsidiary of an Argentine state company. According to the director of Argentina's Atomic Energy Commission, Manuel Mondino, it required the "personal intervention" of President Raul Alfonsin to block this sale.¹⁵⁸ Like the deal with Belgium, this purchase suggested that Libya had succeeded in acquiring other, unknown nuclear facilities - in this case, a supply of spent reactor fuel from which it could extract weapons-grade plutonium through chemical reprocessing. For many years, it was suggested that two West German companies, Transnuklear GmbH and

its parent firm, Nukem GmbH, had made clandestine uranium shipments to Libya; however, a Bundestag commission eventually cleared them off these charges, leaving the mystery intact.¹⁵⁹ Sources in France believe that the Libyans had succeeded in reprocessing approximately 1.2 kilograms of plutonium from targets irradiated in the Russian-built research reactor at Tajjura. Libyan nuclear technicians were trained in Argentina, Brazil, Greece, Turkey, France, and Belgium.¹⁶⁰

In October 1989, a British subject, Derek Smith, was arrested in Athens in carrying 5.5 pounds of uranium, which he claimed was a sample of a 550 pound lot from South Africa he was offering to Libya for \$90,000 per pound. His arrest apparently blocked the larger shipment from reaching Libya.¹⁶¹ Subsequent reports in the British press claimed that the South Africans had tried to get Lloyds of London to insure a charter flight to carry the weapons-grade uranium to Libya, and failing that, had put the sample and the courier on a commercial flight. They also claimed that Smith was suffering from radiation sickness when he was apprehended.

With the collapse of the Former Soviet Union, Moscow ordered its nuclear experts home from Libya, and made plans to withdraw its warships from the Libyan naval base at Tobruk. For its part, Libya tried to take advantage of the dire financial straits of Russian nuclear scientists, and to purchase one of the nuclear submarines the Soviets were withdrawing, reportedly offering as much as \$1 billion. In January 1992, Vyacheslav Rosanov of the Kurchatov Institute of Atomic Energy in Moscow revealed that two of his colleagues had been offered \$2000/month to return to the Tajjura Nuclear Research center, but had refused.¹⁶²

Later that month, the *Sunday Express* in London quoted a Russian scientist, Igor Cherniyev, who claimed he had been working on a top secret Libyan nuclear research program since Sept. 1991, earning nearly \$10,000 per month. Cherniyev added that three other Russian nuclear scientists were working with him, and that Libya was using "the most modern Western technology at the site deep in the Awbari desert."¹⁶³ Libya

promptly denied these allegations. Such reports can be expected to continue in coming months, as Russian nuclear scientists are tempted to seek more lucrative job opportunities abroad.

Project Hamid

Unlike Pakistan, Iraq, or Iran, Libya does not appear to have succeeded in building an indigenous industrial base that would allow it to piece together its own nuclear weapons program free from outside surveillance. The Tadjura nuclear center was totally dependent on the Russians even for normal experimental activities. No other nuclear sites are known to exist.

This didn't mean that Qaddafi wasn't trying to acquire such facilities. One of the most elaborate of these schemes was part hoax, part real. The Libyans referred to it as "Project Hamid, to suggest that it embodied the personal ambition of their leader [or *hamid*], Colonel Qaddafi. It involved an intriguing cast of characters that included a renegade CIA agent, a Lebanese swindler, a Saudi billionaire, a Belgian businessman, and... senior French government officials from the nuclear weapons establishment.

Antoine-Gabriel Tannoury was a trusted confidant of Colonel Qaddafi, who had helped Libya purchase sophisticated weapons from France in the early 1970s, including Crotale ("Saladin") air defense missile systems and sophisticated radar from Thomson-CSF, and embargoed spare parts for American-built C-130 aircraft. Based in France, Tannoury also had excellent relations with officials at the French Ministry of Defense, who were eager to benefit from his personal relationship with Qaddafi.

In 1980, Qaddafi shared his nuclear dreams with Tannoury and asked him to serve as his chief procurement agent. Back in Paris, Tannoury's French friends were more than willing to contribute to the project. They put him in contact with an obscure trading company based in the Seychelles islands, Bizo Electronic Company, which the French

government used as a front for selling off used equipment from its nuclear test center at Mururoa island in the Pacific. In fact, Bizo was controlled by Saudi billionaire Gaith Pharaon, who became Tannoury's partner and financier in Project Hamid.

On Sept. 23, 1980, Pharaon provided Tannoury with a letter of intent from Bizo Electronics, declaring its readiness to provide Tannoury with "surplus electronic equipment" from the French nuclear program.¹⁶⁴ Court records and other documents show that the equipment including a nuclear research reactor and 12.5 kg of highly-enriched uranium, a large volume of missile telemetry and other electronic equipment manufactured by Thomson-CSF, and a miniature conventional power plant, 10,000 kilometers worth of electrical cabling and a numerical controlling system for the nuclear plant made by CGE Alsthom. The whole package was worth a total of \$620 million, for which Tannoury was charging the Libyans double. According to French defense analyst Jacques de Lestapis, "such a sale of surplus nuclear equipment would have been approved by DIRCEN, the French Ministry department in charge of nuclear tests. It could not have been done otherwise."¹⁶⁵

To finance the deal, the Libyan government transferred stock worth 500 billion Italian lira it held in Italy's state owned insurance consortium, Assurazione Generali, to an account controlled by Tannoury in Switzerland. Tannoury then used the stock as collateral to obtain a \$20 million "performance bond" from Pharaon, to guarantee that Bizo and its French government suppliers would deliver the sensitive goods.

Sometime in late 1981, three containers loaded with 54 tons of "surplus electronics equipment" arrived in the French port of Le Havre from Papeete, the capital of the French-controlled island of Tahiti. It has never been revealed precisely what was inside the three containers. However, the Customs documents were altered in Le Havre before the containers were forwarded to Rexine & Co, Tannoury's trading front in Geneva, where their contents was simply identified as "waste." According to sources involved in the deal, the Libyans were supposed to have received 518 tons worth of material in this

manner. The nuclear reactor and the HEU had been declared for sale to Venezuela and would have been shipped to Geneva with the rest of the equipment, if it hadn't been for the personal intervention of Alain Gomez, the new Chief Executive Officer of Thomson-CSF who was appointed by the government of President François Mitterrand in February 1982.

At the same time Tannoury was negotiating his deal with Pharaon, the renegade CIA agent, Edwin Wilson, was contacted by a Belgian associate, Armand Donnay, who claimed to have access in France to enough fissionable material to build a nuclear weapon. "It was decided that a formal proposal would be made to Wilson's contacts in Libya, and soon afterwards, Donnay went there with a stack of documents containing the details of the deal."¹⁶⁶

According to Wilson, Donnay said he was acting on behalf of the French Ministry of Defense, where an official in charge of destroying nuclear test equipment from the Mururoa test site in the Pacific had offered him some of the surplus equipment and arranged to have it shipped back to France. It now appears that the Wilson caper, and the Tannoury affair, were one and the same.

According to Leonard Spector's account, which draws heavily from information provided by Wilson and on the documents and drawings Donnay showed the Libyans, the group was proposing to build an entire nuclear weapons manufacturing and test complex in Libya. Donnay even supplied detailed plans to the Libyans describing how they could modify existing Scud and Frog missiles in their inventory, so they would be capable of carrying nuclear warheads.

Wilson claimed that he was acting on behalf of the CIA, that the deal was for real, and that he intervened to stop it. While Spector does not give Wilson's assertions much credibility, new information showing Tannoury's involvement and the active complicity of French officials suggests there may have been much more to this apparent hoax than meets the eye.

Details of Project Hamid surfaced briefly in June 1986, when the Saudi intermediary, Ghaith Pharaon, sued Tannoury to recoup the \$20 million performance bond Tannoury had cashed in once the deliveries from France slacked off and finally stopped in 1982. The rare mentions that appeared in the French media referred to the case as a hoax, fit for the tabloid press. Tannoury was subsequently awarded French citizenship upon the recommendation of a Gaullist deputy, Philippe Seguin, in 1987, but was condemned to four years in prison by a French court for fraud the following year. The court awarded Pharaon a luxurious apartment that belonged to Tannoury on the prestigious avenue Foch in Paris in partial settlement of the moneys it esteemed Pharaon was owed.

I contacted former French Defense Minister Charles Hernu in 1986 when I was working for Newsweek, and asked him about Project Hamid. “I stopped a delivery of military equipment on its way to Libya disguised as farm equipment,” he recalled, “and there were other contracts with Libya to supply aircraft spares that had been signed by previous governments. But I do not recall any deal by Tannoury or an attempt to stop a nuclear contract with Libya. I would have remembered that.”¹⁶⁷

Company spokesmen at CGE Alsthom and at Thomson-CSF did recall the deal, however, and provided some of the details above, while a former aide to Hernu, who had been at the Ministry of Defense at the time the 54 tons of equipment was shipped from Papeete to Le Havre and Geneva, said he had a clear recollection of the Thomson deals with Libya but insisted that “Thomson has never supplied any measurement equipment for a Libyan nuclear plant.” The former Hernu aide currently works as an assistant to President Mitterrand.

Conclusion

Libya has spent more hard currency on attempts to develop a whole range of unconventional weapons systems than any of the three countries examined in the present study. However, due to mischance, mismanagement, and the continued lack of an educated elite, Libya has clearly gotten the least return on its money.

Colonel Qaddafi will continue his attempts to subvert nuclear technicians and bomb designers from the Former Soviet Union as economic conditions in Russia deteriorate. But if past attempts to use highly-skilled foreign technicians for weapons development in Libya are any measure, then it is difficult to see why these efforts should be met with any greater success.

The greatest danger from Libya will continue to be the ability of Colonel Qaddafi to shift alliances with great rapidity. If he decided, for instance, to pool his resources with Iran or Syria in an effort to develop a new generation of "Islamic Bomb," this would constitute a very real and serious threat to the stability of the region, to Europe, and potentially the world. In their current state of development, however, Libya's unconventional weapons programs in and of themselves do not present a credible military threat.

V. Findings

None the three countries studied in this report would have been able to develop an unconventional weapons capability if it hadn't been for the extensive help they received from outside suppliers, mostly from the G-7 countries. In the case of Libya, dependence on foreign assistance remains almost total. But Iran and Syria are growing increasingly independent as their national technical elites gain experience and as special production facilities are built and equipped. Both must now be considered as indigenous producers of

chemical weapons, and are fast on the way to total independence in ballistic missile production.

Of the three, only Iran has made significant progress toward developing an indigenous nuclear weapons capability. In its present form, the IAEA is powerless to stop a nation such as Iran from pursuing a clandestine nuclear weapons program. Like Iraq before it, Iran has become a key market for Western exporters of high technology and capital goods. Once again, the blind pursuit of profit by Western companies and the political shortsightedness of Western governments have become the predominant forces driving policy toward a regime which continues to execute some 3,000 of its own citizens every year.

Over the past five years, China has emerged as a major new supplier of proliferating technologies. China's leaders have shown time and time again that they will continue to sell the building blocks of mass destruction irregardless of feeble Western protests. The consistent pandering to China by the Bush Administration has only served to encourage China's exports of ballistic missiles and nuclear weapons technologies to Iran and Syria. A much tougher policy toward China is long overdue. A first step would be to cut off sales of sensitive technology.

Other "new" suppliers of mass destruction weapons and technologies such as Argentina, Brazil, and South Africa have refrained in recent years from proliferating sales, in response to supplier pressure and the threat of unilateral sanctions by the United States. Two exceptions to this very hopeful development are India, which has become the Third World's principal supplier of CW precursors, and Pakistan, which has shown that it is ready to peddle the nuclear expertise it has so painfully acquired to the first comer with checkbook in hand.

Export controls

Germany deserves to be singled out for the giant strides it has made over the past year to prevent German companies from creating another Iraq. A tough new Foreign Trade and Payments Act was adopted by the Bundestag on Feb. 14, 1992 that empowers the Customs Criminology Institute to seek court ordered wiretaps of companies and individuals suspected of trafficking in unconventional weapons technologies. Violators can now be sentenced to up to fifteen years, while the total proceeds from an illegal export can be confiscated. German companies are now required to appoint an “export control officer” from among the members of their Board of Directors. This official is legally responsible for export control violations and can be jailed. A new “catch-all” clause in the new law which requires an export license for all goods, regardless of their level of sophistication, if the exporter is aware that they are being used for arms production in the recipient state. A long list of dual-use technologies, many of which are not controlled by other G-7 countries, has also been subjected to export licensing. Finally, the licensing authority has been split off from the Federal Economics Office (as should be done in the United States, where the Department of Commerce continues to promote and control trade at the same time). Both the new Federal Export Office in Eschborn, and the Customs Criminology Institute have been greatly expanded. If enforced, this new legislation will give the German government a powerful tool for discouraging companies from repeating the mistakes of the past.

In the United States, the Senate unanimously adopted the Omnibus Nuclear Proliferation Control Act of 1992 on April 9. Designed in the words of its key sponsor, Senator John Glenn, to “take the profits out of proliferation,” the new bill bans companies which are found to be promoting nuclear proliferation from U.S. government contracts, and, in the case of foreign companies, from selling anything in the U.S. It also imposes penalties against banks and other financial institutions that knowingly assist nations to

acquire a nuclear weapon. However, to date the Bush Administration has vetoed every bill that would impose sanctions on foreign companies because of proliferation concerns. Pushed by accusations of weak export control enforcement, the Administration announced its own Enhanced Proliferation Control Initiative (EPCI) on Dec. 13, 1991, that somewhat improved the situation. However, EPCI still failed to include sanctions against foreign companies violating international proliferation regimes, and was generally greeted as a series of "half-measures."

The record of the French government remains spotty at best. While the French have made a public pledge to back off from their previous policy of sponsoring nuclear weapons proliferation, which the Gaullists used to argue was a legitimate means for Third World countries to gain "national sovereignty" in the face of superpower competition, France continues to shroud its export control system in veils of secrecy. In fact, France still has no legal basis to control the export of sensitive technologies beyond a 1944 wartime decree, which is regularly translated into a new set of Customs regulations as international control regimes change. Computerized export licensing records only date from 1990; before then, records were kept by hand. Even today, the entire export licensing system in France is supervised by a single official at the Ministry of Industry, who is planning to retire later this year. Until early 1992, France had no controls whatsoever on the sale of chemical weapons production equipment, and, as this investigation has shown, was instrumental in creating Syria's CBW capability. French companies are heavily involved in major industrial projects in Iran, Syria, and Libya which could be used for the manufacture of unconventional weapons. These projects have failed to arouse public interest in France and have never been subjected to parliamentary scrutiny.

Export controls in Italy could best be described as chaotic. A new export control law was adopted in August 1990 by the Italian parliament, but it required the government to craft specific regulations to take effect. To date, no regulations have been adopted, and

Italian exporters continue to sell a very broad range of dual-use technologies. Italy has been a major supplier to the Busheir nuclear project in Iran, and is building major steel mill and chemical plants. None of these projects has been subjected to governmental control.

In Britain, the Department of Trade and Industry operates under the same basic contradiction that cripples the Department of Commerce, that of both promoting and controlling trade. Furthermore, DTI officials told the author that they were “unequipped” to carry out computerized analyses of strategic exports to countries of proliferation concern. “Licenses are analyzed on a case by case basis. We perform no global analyses,” a DTI spokesperson, Arlene Butler, insisted in a series of telephone interviews. British Customs has only two active cases concerning illegal exports to Iraq (as compared to more than 90 in Germany alone), and none concerning Iran, Libya, or Syria. Britain is hoping to win major development contracts in Iran, and obviously does not want to be hampered by closer scrutiny of its export control procedures.

Belgium remains true to its reputation as the land where the “dogs do not bark.” Belgian companies remain heavily involved in clandestine deals with Libya, Syria, and Iran, serving as intermediaries for illicit arms sales in a climate of cozy complicity with the Belgian federal government. The state-owned Belgonucléaire has been involved in Libya since 1972, and would have built a key nuclear plant in Libya in 1985 if it hadn’t been for intense U.S. diplomatic pressure.

Japan has tightened its export control procedures since the Toshiba scandal in 1987, although its primary concern has been to demonstrate to the United States that Japan was not selling strategic goods that could be funneled into Soviet weapons programs. Japanese companies were instrumental in the manufacture of the Rabta chemical weapons plant in Libya, and are heavily involved in virtually every dual-use industrial project currently underway in Iran. A list of Japanese suppliers of dual-use technologies to Iran would read like a Who’s Who of Japanese industry.

Finally, there is the Russian wild card. While the risk of “loose nukes” escaping from the Former Soviet Union is likely to diminish as international attention focuses on this issue, a host of other problems have already become apparent. Until now, the Russian government has devised no system to track the whereabouts or safely dispose of its estimated stockpile of 500 tons of weapons grade uranium and 100 tons of plutonium. Worth an estimated \$5 to \$8 billion on the open market, sales on the black market by unscrupulous nuclear traders could net much more, since a supply of weapons-grade fuel is one of the main stumbling blocks countries such as Iran, Syria, and Libya have encountered in their clandestine bomb programs. Beyond this, Russian officials now acknowledge openly that they have no means of controlling the export of dual-use technologies from the thousands of companies in Russia and in the newly independent successor states that manufacture critical components of use in building ballistic missiles, chemical warfare agents, and nuclear weapons.¹⁶⁸ Unless a strict and reliable export control system is established quickly, Russia will soon be responsible for the emergence of a half-dozen new nuclear weapons states over the next decade.

Recommendations

- Export control regimes in the West need substantial revision to become more effective in preventing the flow of strategic technologies to the Third World. A single, unified proliferation control regime should replace the four different control regimes that currently exist, with uniform enforcement standards such as those developed by COCOM member nations. As it stands today, governments are not sharing the information they possess, even among their own licensing agencies. Unifying the control regime will make it easier to perform a comprehensive analysis of a country’s proliferation intentions. The new regime should be empowered to review potential exports of proliferation concern before they occur, similar to the way COCOM has functioned.

- While this future Proliferation Control regime must be a multilateral undertaking, geared broadly toward controlling (not preventing) the flow of strategic technology from the industrial north to the developing south, the difficulty of negotiating new guidelines should not be used as an excuse to lift existing unilateral controls in the meantime. Measures such as the Glenn Bill (The Nuclear Non-Proliferation Act of 1992) deserve unqualified support. Proliferation is a danger now.

- The new German export control law, which requires companies to designate a member of their Board of Directors as legally responsible in the event of export control violations, should be generalized as part of the new international regime. Germany should be encouraged to play a leading role in developing a common standard for export controls and enforcement.

- The licensing role should be separated, as a general rule, from trade promotion. In the United States, this would mean setting up an all new Export Control Agency, separate from the Department of Commerce, as proposed by the House Subcommittee on Commerce and Consumer Affairs last year.¹⁶⁹

- Furthermore, export licensing review must include a strategic assessment by defense agencies of member countries, since the proliferation of weapons of mass destruction is not a trade problem, but a security problem.

- Members of the new international proliferation control regime should be encouraged to exercise greater transparency. Export licensing lists, eventually scrubbed of information judged of a proprietary nature, should be made public on a regular basis, to encourage public scrutiny and to ensure that exporting companies have access to the information they need to determine whether a given country or project is of proliferation concern. Proliferation is too serious an issue to become the elite province of a handful of government bureaucrats, no matter how skilled or well-intentioned they may be.

- Other suppliers of dual-use technologies, including Russia, China, Argentina, Brazil, and India, should be granted “associate” status in the new regime and expected to

adhere to its guidelines. Assistance should be provided these countries to help them establish effective export control regimes.

- Trade and aid to Russia, China, Argentina, Brazil, India and other “associate” members should be made subject to their good proliferation record, as a means of convincing them to cooperate with the proliferation regime. The Bush Administration’s abysmal appeasement of China despite China’s repeated sales of ballistic missiles and nuclear technologies to the Middle East has shown how *not* to handle proliferation.

- Post sale inspections of licensed goods must be made compulsory for certain categories of goods. In the case of large turnkey factories with a dual-use capability, the purchasing nation should accept the cost of stationing an expatriate inspector on the site full time as a condition for the sale, to ensure there is no diversion to military production. These inspections should be the legal responsibility of the companies making the sale; violations (including falsified reports) should be made a criminal offense, that could lead to jail terms and confiscation of the proceeds of the sale.

- Since Third World will themselves be the first to suffer from the use of weapons of mass destruction, they should be encouraged to cooperate with the new proliferation regime. In return for a good “proliferation record,” cooperating countries should be allowed reasonable and prompt access to advanced Western technologies for use in legitimate civilian development projects which they subject to ongoing monitoring.

Attachment 1:

Suppliers of Dual-Use Technologies to Iran, Syria, and Libya

Our investigation has led us to identify approximately 300 companies we have reason to believe played a significant role in the development of unconventional weapons programs in Iran, Syria, and Libya.

Few of these companies acted illegally; indeed, many believed they had been contracted to work on perfectly legitimate civilian programs. In the listing that follows, "category" should be understood to mean the potential area of potential dual-use (chemical, nuclear, etc) to which the items delivered could or have been applied.

One of the principle findings of this and earlier reports commissioned by the Simon Wiesenthal Center has been the inherent dangers of licensing dual-use technology to countries such as Iran, Iraq, Syria, or Libya, who have clearly expressed their intent to develop weapons of mass destruction

We believe that the licensing governments should exercise greater control over dual-use technology sales in the future, with the aim of reducing their volume. After all, even in the case of a major exporting nation such as Germany, the percentage of dual-use exports as compared to total exports to countries of proliferation concern is relatively low. These sales could be substantially reduced, without adversely affecting the national economy.

Suppliers by country

Argentina	5
Austria	1
Belgium	8
Brazil	1
China	8
Czechoslovakia	3
Denmark	1
France	29
Germany	100
Greece	1
Holland	1
Hong Kong	1
Hungary	1
India	2
Iran	4
Ireland	1
Italy	13
Japan	8
Libya	2
Liechtenstein	1
Mexico	1
Netherlands	2
North Korea	1
Norway	2
Russia	2
Seychelles	2
Singapore	1
South Korea	2
Spain	6
Sweden	8
Switzerland	13
Syria	2
Thailand	1
UK	22
USA	43
Yugoslavia	1
Total	300

Iranian Front Companies

Like Iraq, the Iranians recognized the inherent weaknesses of Western export controls, and understood that they could purchase virtually whatever they wished as long as they provided financial incentives to Western businessmen and Western governments. Once the war with Iraq was over, Iran revived billions of dollars worth of development projects, and often used these as fronts to purchase strategic technologies for their nuclear weapons program. Even the United States supplied equipment to the Iran's strategic weapons programs. Universities, medical centers, and government institutions - including the Ministry of Sepahⁱ - were listed as end-users on export licenses applications.

These are some of the front companies most frequently employed by Iran for these purchases, and a sampling of the type of equipment they sought in the U.S.

Amir Kabir Technical University:	Computer, Unix software, and training from NCR, Apple Computer, Sun Microsystems; neutron-shielding from Reactor Experiments, Inc;
Atomic Energy Organisation of Iran:	Oscilloscopes (nuclear-controlled item) from Terrin Associates; VAX PDP 11/55 computers from KWU (West Germany); Photographic precision equipment, oscilloscopes, and computers from Perkin Elmer Corp; Neutron shielding from Reactor Experiments Inc;
Beheshti Medical Sciences University:	Blood chemistry analyzers from Technicon Instruments Corp
Daneshgah Olum Pezeshki Ahvaz	Blood chemistry analyzers from Technicon Instruments Corp
Daneshgah Olum Pezeshki Mashad	Blood chemistry analyzers from Technicon Instruments Corp
Dor Argham Ltd	High-speed computers from Atlantic Digital Systems & Services
Education & Research Institute	Underwater video systems for submersible vehicles from Videospection Inc; satellite down-link station from Industrial Electronics GmbH; communications equipment from Terrin Associates, Ltd. This license lists the Iranian purchaser as "part of the Ministry of Defense."

ⁱSepah is the Iranian term for the Pasdaran.

GAM Iranian Communication Electro-Metrics Inc (license rejected)	Radio spectrum analyzers from
Ghods Research Center Associates, Ltd	Calibration equipment from Terrin
Helicopter Service Organization equipment from Rockwell International	Avionics and aerial surveillance
Iran Aircraft Industries International Corp; machine-tool controllers for metal-working machines from Trumpf GmbH	Calibration equipment from Fluke
Iran Argham Co NDS Deutschland GmbH, Siemens, Recognition Equipment Inc, Cipher Data Products Inc, and from NCR Corp (Iran Argham services as the NCR distributor in Iran, and purchases large quantities of computers for local resale to unspecified customers); electronic test equipment from Terrin Associates;	High-speed computers from REI
Iran Communication Industries Technology Management Inc	Satellite earth station from Satellite
Iran Electronic Industries analyzers, test equipment, and electronics manufacturing equipment from Norstream Intertec, Inc; oscilloscopes and spares from Terrin Associates	Computers, radio spectrum
Iran Helicopter Training Center Aircraft Corp (denied)	Military helicopters from Schweizer
Iran Marine Industrial Company Computer System AS	CAD/CAM software from Kockums
Iranian Research Organization digital data transmission circuits from Haleyon Data	Computer diagnostic equipment for
Ministry of Sepah oscilloscopes, and test equipment from Terrin Associates; computerized mapping equipment and satellite transmission gear for Global Positioning System from Wild Heerbrugg; test and calibration equipment from Fluke International Corp; military trainer aircraft from FFA Flugzeugwerke Altenrhein; materials test equipment from Zwick GmbH	Radio spectrum analyzers,
NIOC Petrochemicals Research Institute warfare from Aldrich Chemical Co to be used "as reference for analytical purposes"	Precursor chemicals for chemical
Research & Development Group AAT Communications Corp	Microwave test equipment from
Sazemane Sanaye Defa (Defense Industries Organization)	Test equipment from Tektronix Inc
School of Aviation and Navigation from NCR Corp	Computers and data base software

Sharif University of Technology

Radio spectrum analyzers from Kay Elemetrics Corp; VAX computers from Digital Equipment Corp; precision measuring instruments from Leybold Inficon Inc; precision instruments for nuclear engineering department from Canberra Industries, Inc

Taradis Iran Computer Communication

Computers from AST Research Inc

Zakaria Razi Chemical Company

Oscilloscopes and transient recorders from Tektronix Inc, to monitor chemicals production; gas chromatography system from Varian Associates.

Attachment 3:

Licensed Technology Sales to Iran from Germany (millions of DM)

License applications were catalogued by Schedule as follows:

A = Munitions list items

B = Nuclear Suppliers Group items

C = Dual-use goods (COCOM list + MTCR)

D = Chemicals and chemical manufacturing equipment

E = Goods relevant to production of biological weapons

Year	A	B	C	D	E	Total
1982	6.1	N/A	10.9	-	-	N/A
1983	189.1	0	67.7	-	-	256.8
1984	152.6	0	146.6	-	-	299.2
1985	68.8	0	529.8	N/A	-	N/A
1986	143.8	0	95.1	-	-	238.9
1987	43.3	0	89.4	-	-	132.7
1988	0.1	0	158.5	4.2	-	162.8
1989	0	0	699.4	0.5	-	699.9
1990	-	0.2	363.6	1.4	-	365.2
1991	0	0	1417.2	370.8	0.1	1788.1
Totals	408.6	N/A	3578.2	N/A		4542.3+
<i>Total German exports to Iran over same period</i>						45,000.4
Licensed trade as percentage of total trade:						+/- 10%

Source: Federal Ministry of Economics, Bonn/Bundestag

Key:

0 = less than 50,000 DM

- = nil

N/A = fewer than 3 licenses, so figures withheld.

An Iranian Nuclear Chronology, 1987-1992

Iran purchases calutron *China* 1987 Iran purchases a small calutron from China, for the purpose of stable isotope production. However, "Iranian experts have reportedly experienced difficulties in getting it to work at design current." (NuclearFuel, 12/9/91)

Chinese nuclear designs *China* 1987-88 The AEOI has been acquiring nuclear facility design information from China since the late 1980s (Nucleonics Week, 5/23/91)

Nuclear engineers trained in China *China* 1987-88 Fifteen nuclear engineers from the AEOI have been trained in nuclear reactor design and research in the PRC under a clandestine bilateral agreement signed after 1985.(Nucleonics Week, 5/2/91)

Chinese technology for Isfahan *China* 1989 China is providing drawings and equipment to build a nuclear research reactor in Isfahan (Nucleonics Week, 5/2/91)

South Africa deliveries uranium *S. Africa* 1988-89 "Large quantities" of uranium concentrate delivered in 1988-1989 (Nucleonics Week, 5/2/91)

IAEA Director to Tehran *IAEA* 8/11/89 Hans Blix travels to Iran to discuss Iran's "peaceful" nuclear programs (Tehran Domestic service, 8/11/89)

10-Year arms agreement signed *China* 1/20/90 A 10-year nuclear and military cooperation agreement is signed in Tehran by Iranian Defense Minister Akbar Torkan and the Deputy Director of China's Council of Science and Technology, General Jiang Xua (Tehran radio, 1/20/90).

Iranian atom scientists visit India *India* 2/91 A team of Iranian Atomic Energy Agency officials visit India in Feb 1991, to discuss purchase of a 10 MW research reactor from India.(Hong Kong AFP, 11/9/91)

KWU talks continue *Germany* 3/4/91 The German Company Kraft Werk Union, which is committed to build two nuclear power plants at Busheir that were begun in 1976 but shelved at the start of the Islamic Revolution, is completing plans on how to complete the project (IRNA, 3/4/91)

VP inaugurates nuclear center *Iran* 5/11/91 Vice President Hasan Habibi inaugurates the nuclear agricultural and medical research center in Karaj. (Tehran Voice of IRI, 5/11/91).

PRC Premier tours nuclear sites *China* 7/7/91 Chinese Premier Li Peng arrives in Iran on July 7 for a tour of Iranian nuclear sites. Following a meeting with the Chinese, Rafsanjani says Busheir nuclear center will be completed "We are determined to complete this major project and will do so with the help of God".(Sawt al-Kuwayt al-Duwali, 7/11/91)

Brazilian minister to Tehran *Brazil* 7/7/91 Brazilian infrastructure minister, Joao Santana, arrives in Tehran to discuss the sale of \$150 million worth of German nuclear equipment from the Angra III power station (Financial Times, 5/12/91)

Syrian COS meets Shahbazi *Syria* 9/26/91 General Hikmat Shehabi meets with Iranian chief of staff, Maj General Ali Shahbazi in Tehran. Shahbazi voices "Iran's readiness to cooperate with Syria in military and non-military areas," and visits Iranian military plants over the next 6 days. (Irna, 9/26/91).

Borujerdi to India on reactor deal *India* 10/10/91 Deputy Foreign Minister Alla'eddin Borujerdi visits Delhi, to discuss the purchase of a 10 MW nuclear reactor with Prime Minister Narasimha Rao (Hong Kong AFP, 11/9/91)

Eurodif agreement signed *France* 10/25/91 France and Iran sign a \$1 billion preliminary agreement in Paris, settling the financial dispute over Iran's participation in the Eurodif uranium enrichment consortium.

Indian to Tehran on reactor deal *India* 11/9/91 Indian Foreign Minister Madhav Singh Solanki, arrives in Tehran for talks on the 0 MW nuclear research reactor (IRNA, 11/9/91).

U-technology from Pakistan *Pakistan* Late 1991 German intelligence "has recently determined" that Iran may have imported uranium melting technology from Pakistan, which the Pakistanis got from Urenco in the mid-1980s. (NuclearFuel, 12/9/91)

Eurodif agreement finalized *France* 12/29/91 The secretary general of the French foreign ministry, Francois Scheer, travels to Tehran to sign the final 16-point version of the \$1 billion Eurodif agreement (AFP 12/29/91)

France to supply HEU *France* 1992 Reports circulate of a secret addendum to the Eurodif agreement, involving the supply of highly-enriched uranium to Iran, as per the original Eurodif arrangements. France denies that it will deliver HEU to Iran. (London Al Sharq Al Awsat, 12/31/91)

Syria and Iran sign nuclear pact *Syria* 1/15/92 Iran and Syria have reportedly signed a nuclear pact, negotiated by a Syrian military delegation that has been in Iran since Oct 1991 (Hamburg DPA, 1/23/92).

Khaddam leaves for Iran *Syria* 1/20/92 Syrian VP Abdalhalim Khaddam left for Tehran today, for a meeting of the Joint Syrian-Iranian Higher Committee. (Syrian Arab Republic Radio, 1/20/92). After meeting with

Khaddam, Rafsanjani told Iranian TV (Jan 21) that "under the current sensitive conditions, greater cooperation is in the interest of the two nations and the Islamic ummah."

Argentina suspends nuclear deliveries *Argentina* 1/26/92 Argentina has agreed to suspend nuclear deliveries governed by an \$18 million contract between Iran and the Argentine National Institute for Applied Research (INVAP), the Deputy Foreign Minister announced today. (Le Monde, 1/29/92)

IAEA inspection finds no diversion *IAEA* 2/12/92 Jon Jennikens, Deputy Director for Safeguards, says at the end of a week-long IAEA visit to Iran that "nothing we have seen proves that there is any activity here against the peaceful principles of nuclear policy." The IAEA team visited six sites: Busheir, Isfahan, Tehran, Karaj, the Saghand/Yazd uranium project, and Moallem Kalayeh (IAEA Press release, 2/14/92).

Iran will complete Busheir plant *Germany* 2/26/92 The President of Iran's Atomic Energy Organization, Reza Amrollahi, said at an IAEA Board of Governors meeting today that Iran intended to complete the Busheir nuclear power plants. (Irna, 2/26/92).

3 nuclear warheads sold *Kazakhstan* 3/28/92 General Viktor Samoilov, in charge of disarmament for the CIS, has acknowledged that "three more" nuclear warheads were missing from Semipalatinsk, and were presumed sold by Kazakh government to Iran (CNN 3/28/92; US News & World Report 4/6/92).

NOTES

¹Testimony by CIA Director Robert M. Gates before the Senate Governmental Affairs Committee, Jan 15, 1992. Quotes taken from the Committee's transcript of the hearings.

²*BBC World Service*, Jan 14, 1992. For the complete transcript of the Cheney remarks, see the USIA *Wireless File*, dated Jan 15, 1992. Cheney also argued, as others in the Administration have done, that the proliferation threat justifies the continued development of SDI. While Congress has approved early deployment of a ground-based interceptor for 1996, proliferation analysts outside the government dispute the need for space-based interceptors. According to Aaron Karp, of the Stockholm International Peace Research Institute, "the missiles likely to spread through the Third World by the end of the century will almost exclusively be short-range missiles similar to Iraq's SCUDs, which are better countered by a ground-based ATBM system along the lines of the Patriot, than by sophisticated and expensive space-based interceptors." (*Middle East Defense News* [hereafter *Mednews*], Feb 3, 1992.)

³The German firm Siemens told Iran in 1989 that it will cost up to \$3 billion to complete work on two nuclear power plants at Bushehr, above and beyond the estimated \$3 billion already spent on the project.

⁴One IAEA inspector did attempt to sound a warning in 1981, but he was reprimanded and eventually fired by the IAEA for going public with his reservations about Iraq's nuclear weapons program. For details, cf Kenneth R. Timmerman, *The Death Lobby: How the West Armed Iraq*, Houghton Mifflin, New York, 1991; pp99-100.

⁵The IAEA began "intrusive" inspections in Iraq on in June 1991, under the aegis of the UN Special Commission. Among other forbidden activities discovered at Thuwaitha and described in the various IAEA Inspection Reports were plutonium reprocessing and research into uranium enrichment.

⁶Paul Leventhal, "Plugging the Leaks in Nuclear Export Controls: Why Bothyer?" in *Orbis*, Spring 1992, p169.

⁷*Middle East Economic Digest* (MEED), 1 March 1991.

⁸Iranian News Agency [hereafter IRNA], *Foreign Broadcast Information Service, Near East and South Asia Daily Report* [hereafter FBIS NES] Feb 3, 1990.

⁹"Post-Khomeini Iran: Looking for Friends," *Mednews*, June 26, 1989. Iran had been clandestinely purchasing Soviet arms for years. Cf Kenneth R. Timmerman, *Ol ins*

Feuer (Fanning the Flames), Orell Fusli, Zurich (Switzerland), 1988, Chapter 9: "'Iran's New Soviet Arsenal.". Soviet deliveries had become so extensive they prompted Iraqi Defense Minister, General Adnan Khairallah, to bitterly remark in 1985 that "eighty percent of the weapons we capture today [from Iran] are of Soviet origin" (*La Lettre de Baghdad* (a publication of the Iraqi Embassy in Paris), November 7, 1985.)

¹⁰Interviews with Soviet arms export officials in Dubai, "Soviets to Build MiG-29 in Iran," *Mednews*, Nov 25, 1991, and "Iran Poised to Become Regional Superpower," *Mednews*, Jan 20, 1992. Cf "Defense Official Confirms Arms Deal with Russia," *Sawt al-Kuwait* (FBIS 16 Jan 1992)

¹¹"Arms to Iran," *Jane's Defense Weekly*, Jan 18, 1992.

¹²The tank plant was first reported by the opposition People's Mujahidin of Iran (PMOI) in a statement dated Feb 2, 1992, and was picked up by Roland Evans and Robert Novak in the *Washington Post* on Feb 5. However, the sale of some 250 T-72s from Russia had been reported earlier. Cf *Jane's Defense Weekly*, Jan 18, 1992.

¹³Radio Free Europe/Radio Liberty *Research report*, January 23 1992,

¹⁴"Shaposhnikov says CIS will cut arms to Iran," *International Herald Tribune*, 3 Feb 1992.

¹⁵Cf for instance the Feb 12, 1992 statement by Yeltsin advisor Galina Starovoytova that the Russian Federation "intended to continue arms supplies under long-term contracts concluded by the former leadership." [FBIS, Soviet Union, 15 Feb 1992]; and the subsequent announcement by Russian first deputy minister for foreign economic relations, Sergey Glazyev, that Russian would continue to export arms "on a purely commercial basis." (*FBIS Soviet Union*, March 4, 1992).

¹⁶*FBIS Soviet Union*, March 2, 1992.

¹⁷24 Su-24 fighter bombers, 7 Su-25 close support aircraft, 40 Su-22 and 4 Su-20 assault aircraft, 12 MiG 23/27, and 4 MiG 29. It is not known yet whether Iran planes to operate the 24 French-built Mirage F1 the Iraqis also flew out, which will require a separate logistics chain. Cf *Mednews*, Sept 15, 1991.

¹⁸Interview with Air Force chief, General Mansur Sattari, Tehran *Keyhan* (FBIS 3 Nov 1989); and IRNA (FBIS 13 June 1990). Before the war with Iraq in 1980, the Imperial Air Force counted 519 combat aircraft, all supplied by the United States. By 1988, this force had fallen to an estimated 74 planes in airworthy status, because of cannibalization and lack of spare parts.

¹⁹*FBIS NES* March 11, 1988, Tehran Television Service, March 10, 1988.

²⁰*FBIS NES* April 21, 1988, IRNA, April 16, 1988

²¹*FBIS NES* March 4, 1988, Tehran Radio, March 3, 1988

²²JPRS Nov 2, 1982, Tehran *Keyhan*, September 27, 1982

²³*Flight International*, October 20 1984

²⁴Interviews with a French businessman in Paris, 29 Jan and 31 March 1988.

²⁵*FBIS NES* March 11, 1988, Tehran Television, March 10, 1988

²⁶Sources: *Jeune Afrique* No 1355-1356, December 24 - 31, 1986, FBIS February 16, 1988, IRNA, February 11, 1988, FBIS NES February 25, 1988, Tehran Domestic Service, February 24, 1988, FBIS March 9, 1988, Tehran Domestic Service, March 7 and March 9, 1988, FBIS March 11, 1988, Tehran Television, March 10, 1988, FBIS March 15, 1988, The OBSERVER, March 13, 1988, FBIS March 16, 1988, Tehran Domestic

Service, March 15, 1988, FBIS March 22, 1988, Tehran Television Service, March 19, 1988, FBIS March 30, 1988, IRNA, March 29, 1988, FBIS, April 8, 1988, Tehran Domestic Service, April 7, 1988, FBIS April 11, 1988, Tehran Television Service, April 8, 1988, FBIS April 13, 1988, Tehran Television Service, April 7, 1988, FBIS April 15, 1988, Tehran Domestic Service, April 14, 1988 and IRNA, April 14, 1988, FBIS April 21, 1988, Tehran Domestic Service April 16, 1988 and IRNA, April 18, 1988, FBIS April 28, 1988, Tehran Domestic Service, April 28, FBIS June 27, 1988, IRNA, June 27, 1988

²⁷*Arms Production in the Third World*, Edited by Michael Brzoska and Thomas Ohlson; Taylor & Francis, London, 1986.

²⁸IRNA, *FBIS NES* 13 June 1990.

²⁹Interviews with Bani Sadr in Versailles, France, in 1986 and 1987.

³⁰DMS, Inc, *Market Intelligence Report*, Stamford, Conn, 1984.

³¹Interview with an SNPE export marketing executive, Cairo, November 1987.

³²FBIS NES 2 March 1989.

³³Interviews with Swedish Customs officials in Stockholm.

³⁴Mednews, Nov 2, 1987. Libya was said to have delivered five SS-12 launcher in 1984, according to SIPRI, but these were probably SCUD launchers and arrived with the missiles in early 1985. Cf "The North Korean Scud B Programme," by Joseph S. Bermudez Jr and W. Seth Carus, in *Jane's Soviet Intelligence Review*, April 1985.

³⁵Timmerman, *Fanning the Flames*, Chapter 9. Cf The *Economist Confidential Foreign Report*, July 18, 1985; and *Middle East Economic Digest*, June 29, 1985. For an analysis of Libyan-Iranian relations, see Mohammad-Reza Djalili, "Le Colonel, L'Ayatollah et les Autres" in *Politique Internationale*, No 33, Autumn 1986.

³⁶W. Seth Carus, "Missiles in the Middle East: A New Threat to Stability," *Policy Focus*, The Washington Institute for Near East Policy, June 1988.

³⁷The USSR opened a direct route for shipping arms to Iran in March 1985, following embarrassing searches of Iranian bound cargo ships by Saudi and Egyptian authorities two months earlier. Soviet weapons were now shipped by canal across Soviet Armenia to the Caspian Sea, and unloaded at northern Iranian ports. See Tokyo *Kyodo* English language service, August 12, 1985.

³⁸These documents are described in detail in Timmerman, *Fanning the Flames*, chapter 9.

³⁹By 1982, 40% of Iran's weapons imports was coming from North Korea. See *World Military Expenditures and Arms Transfers*, Arms Control and Disarmament Agency (Department of State, Washington, 1985). By late 1985, ACDA estimated that China had sold Iran \$2.5 billion in weapons from 1980-1985.

⁴⁰Bermudez & Carus, "The North Korean SCUD B Programme," op cit. I am indebted to the insights of both authors for this section.

⁴¹Carus & Bermudez, "Iran's Growing Missile Threat," *Jane's Defense Weekly*, July 23, 1988.

⁴²See for example MEED 29 Nov 1991, and 21 Feb 1992.

⁴³FBIS NES April 13, 1988, Tehran Television, April 7, 1988.

⁴⁴*Iran Times*, Oct 12, 1989.

⁴⁵Steven Emerson, "The Postwar Scud Boom," *The Wall Street Journal-Europe*, July 11, 1991; the site mentioned is probably Shahroud.

⁴⁶IRNA, quoted by NY Times, Jan 30, 1991.

⁴⁷Bill Gertz, "US: Iran fired ballistic missile," *Washington Times*, May 24, 1991

⁴⁸Beirut *Al-Diyar* in Arabic, 12 Jan 1992 (FBIS NES, 23 Jan 1992); cf *Washington Times*, March 1, 1992.

⁴⁹*Middle East*, 3/88.

⁵⁰Details of the Chinese tender first appeared in *Mednews*, Nov 31, 1988.

⁵¹More recent reports on the Nazeat have downgraded it to a range of 90 km, suggesting production problems. See W. Seth Carus, "Long Range Rocket Artillery in the Third World," *Jane's Intelligence Review*, Oct. 1991.

⁵²Interview with Leonard Walton, the head of Strategic Investigations, U.S Customs Service, in Washington, August 1988. Cf *Mednews* Sept 13, 1988.

⁵³Steven Zaloga, "Ballistic missiles in the Third World: Scud and Beyond," *International Defense Review*, 11/1988.

⁵⁴Tehran Radio, Jan 21, 1990. The first Western report of the China-Iran 10-year cooperation agreement appeared in *Mednews*, March 5, 1990.

⁵⁵"Syria said to have offered chemical weapons to Iran," *Washington Times*, 9 December 1985.

⁵⁶The Silkworm base was revealed by General George Crist, of the U.S. Central Command, in wire reports dated June 1, 1988. Cf AP and AFP.

⁵⁷Mr Capmas is still engaged in business with Iran, and attended a meeting of the Franco-Iranian Chamber of Commerce in Paris on March 24, 1992, dedicated to exploring methods of expanding Franco-Iranian trade, according to documents in possession of the author.

⁵⁸*FBIS NES* March 29, 1988.

⁵⁹Kenneth R. Timmerman, *The Death Lobby*, chapter 15.

⁶⁰IRNA dispatch, *FBIS NES* Oct 19, 1988.

⁶¹Farzad Bazoft and Allan George, "Missiles Armed with Chemical Warheads in Sight," *The Observer* (London), 13 March 1988.

⁶²*Die Tageszeitung*, Jan 28, 1992.

⁶³Interview with the author, May 6, 1992.

⁶⁴Reply to parliamentary questions from the SPD by Klaus Beckmann, Parliamentary State Secretary for the Federal Economics Ministry, dated June 3, 1992. Author's translation.

⁶⁵Iran made a parallel effort at this time to acquire toxic fungi in Canada and the Netherlands, ostensibly for medical research. These attempts were organized by the Iranian Research Organization for Science and Technology, and by the Imam Reza Medical Sciences University at the Meshed Medical Sciences University. The fungi could be used for making powerful biological warfare agents called mycotoxins. In both cases, the Western governments intervened to block the sales.

⁶⁶Written reply to questions from the author from Lurgi's Managing Director, E.D. Menges, dated June 22, 1992.

⁶⁷Reply by the Federal Ministry of Economics, dated June 3, 1992, to parliamentary questions on German exports to Iran from the opposition SPD.

⁶⁸*Der Spiegel*, 18 Nov 1991 in FBIS-WEU 19 Nov).

⁶⁹Cf "US halts British firm's "nerve gas" plant deal in Iran, *The Observer*, Feb 4, 1990; "Swiss Abandon Iran Chemical Project," *International Herald Tribune*, May 10, 1989; "Nerve Gas Technology to Iran Prevented," *Vrij Nederland*, March 17, 1990 (FBIS-WEU, 22 May 1990); "Iranian Quest for Toxic Fungi Was Blocked, Spy Experts Say," *International Herald Tribune*, 14 Aug 1989.

⁷⁰W. Seth Carus, *Chemical Weapons in the Middle East*, Washington Institute for Near East Policy, Policy Focus paper Number 9, Dec 1988, p 5.

⁷¹Because of the "superiority" derived from nuclear weapons, Mohajerani said, "therefore Muslims should strive to go ahead" to develop them. "I am not talking only about one Muslim country, but rather all the Muslims states. Israel should be totally deprived of its nuclear capacity. I mean what has been done to Iraq in respect of its nuclear capacity should be done exactly to Israel. In other words the atomic capacity of Muslims and Israel should be at par. If Israel should be allowed to have nuclear power then, Muslim states, too, should be allowed to have same. That is not the business of the United Nations or of the Security Council or the investigating committee to decide." Text of interview with *Al Abrar* daily, Tehran, Oct 23, 1991. Cf *Mednews*, Vol 5, No 4 (Nov 25, 1991).

⁷²"Iran trains nuclear engineers in Pakistan," *Mednews*, Dec 5, 1988.

⁷³Kenneth R. Timmerman, *Fanning the Flames: Guns, Greed, and Geopolitics in the Gulf War* (syndicated by New York Times Syndication Sales, 1986-87; published in German as *Ol ins Feuer* by Orell Fusli, Zurich, 1988); chapter 4.

⁷⁴*Mednews*, Vol 2, No 5 (Dec 5, 1988).

⁷⁵Ansaldo was a major subcontractor to KWU and Siemens for equipment destined for the Busheir nuclear power station, and attempted - unsuccessfully - to procure VAX computers in the United States on behalf of Iran in 1991

⁷⁶Amir Taheri, "Iran Starts New Major Nuclear Project," *Die Welt*, 27 Jan 1992 (quoted in *FBIS NES* 28 Feb 1992).

⁷⁷Interview with Eliyahu Ben Elissar, President of the Defense & Foreign Affairs Commission of the Israeli Knesset, Jerusalem, May 16, 1992.

⁷⁸Interview with David Kay, Director of the Uranium Institute, London, May 7, 1992.

⁷⁹*Nucleonics Week*, May 2, 1991.

⁸⁰"Uranium Bullion Plant to Be Set up in Yazd," Tehran Domestic Service in Persian, 8 Oct 1989, and "Survey of Uranium Samples Completed," Tehran Television Service in Persian, 10 Oct 1989, both translated in *FBIS NES*, 12 Oct 1989.

⁸¹Tehran radio announced the signature of the 10-year arms and technology agreement. See *FBIS NES*, Jan 21, 1990.

⁸²The head of export licensing at DTI, Michael Kuligan, refused to be interviewed for this report; the above comments were made through a spokesperson, Arlene Butler, in repeated discussions in early May 1992.

To perform the analysis that follows, we used a desktop Macintosh SE/30 system, equipped with Claris Filemaker II data base software which retails for less than \$200.

⁸³Gary Milhollin of the Wisconsin Project on Nuclear Arms Control, conducted the first non-government analysis of U.S. licensing policy toward Iran and Syria in July

1991. See "Exports and Terrorism: U.S. Export Licenses to Iran and Syria: 1986-1990," published by the Wisconsin Project, 1900 L. Street, NW, Washington, DC 20036.

⁸⁴The United States unilaterally applied MTCR standards in 1985, although the agreement was only signed by the six other member states - Canada, France, Britain, West Germany, Italy, and Japan - in April 1987.

⁸⁵The new ordinance, Article 5d, requires export licenses for any goods headed for a nuclear program in twelve countries: Algeria, India, Iran, Iraq, Israel, Jordan, Libya, North Korea, Pakistan, South Africa, Syria, and Taiwan. However, German officials said in interviews that it the new regulation "primarily targeted Busheir."

⁸⁶The repeated, very large purchases of dual-use equipment by Ray Amiri, an Iranian-born computer consultant, attracted the attention of U.S. Customs and of the Commerce Department's Export Enforcement unit. Amiri was indicted on Aug 21, 1991 in California, along with a colleague, Don Danesh. From 1987 through Aug 1991, Amiri applied to ship \$15 million worth of dual-use equipment to Iran, in 76 separate licenses. It is not known how much equipment, if any, he shipped to Iran without a license.

⁸⁷Walid Abu Zahr, "Iran Purchased Three Nuclear Bombs," in the pro-Iraqi *Al Watan al Arabi*, Dec 27, 1991 (*FBIS NES*, Jan 15, 1992). This account, was immediately denied by Iranian foreign minister Ali Akbar Velayati. With additional details, it was circulated widely in Washington by Yossef, a researcher for the House Republican Research Committee's Task Force on Terrorism and Unconventional Warfare, who published a background paper, "Iran's Strategy and Nuclear Capabilities," on Jan 20, 1992. Bodansky refused in interviews to specify his sources; however, his account is identical in major points with the *Al Watan al Arabi* and other published accounts.

⁸⁸Interview conducted on 24 March 1992. The official, who has access to intelligence information, requested anonymity.

⁸⁹*US News & World Report*, April 6, 1992.

⁹⁰Roger Faligot and Ian Mather, "Iran has N-bomb," *The European*, April 30-May 3, 1992.

⁹¹Hamburg DPA press agency, translated in *FBIS NES*, 1/24/92. Yossef Bodansky, of the House Republican Research Committee, was the first to use the term "nuclear umbrella" to describe Iranian-Syrian nuclear relations.

⁹²Interview with the author, Rome, June 15, 1992 (see also *Mednews*, July 6, 1992).

⁹³Interview with the author, Rome, June 15, 1992.see also *Mednews*, July 6, 1992).

⁹⁴For an excellent account of the relation between foreign aide and Syria's military buildup, see Patrick Clawson, "Unaffordable Ambitions: Syria's Military Build-up and Economic Crisis," *Policy Paper* Number 17, The Washington Institute for Near East Policy, 1989.

⁹⁵*Global Spread of Chemical and Biological Weapons*, Hearings before the committee on Governmental Affairs and its Permanent Subcommittee on Investigations, US Senate, Feb 9, 1989 (and subsequent dates); p 12.

⁹⁶Interviews in Tel Aviv, May 14-16, 1992.

⁹⁷W. Seth Carus, "Chemical Weapons in the Middle East," *Policy Focus* Number 9, The Washington Institute for Near East Policy, Dec 1988.

⁹⁸Interview with a U.S. intelligence analyst, Washington, March 1992. The initial *Al-Ittihad* report on this second Pikalov visit (*FBIS NES*, June 13, 1988), hastily

concluded that the USSR had acceded to the Syria missile and CW request. Subsequent reports (cf Aaran Karp, "Ballistic Missile Proliferation," in the *SIPRI Yearbook*, 1989) suggest that the SS-23 sale was rejected by Moscow in 1987 and that the Pikalov visits focussed on new Syrian requests to receive CW warheads for the SS-21 missiles they had recently received. *Argumenty I Fakty* responded in Sept 1988 that reports of CW sales by the USSR to Syria "are not in accordance with reality. The USSR does not transfer chemical weapons to other countries and does not teach them how to produce such weapons." [Translated in *FBIS Soviet Union*, Sept 2, 1988, p6-7).

⁹⁹*FBIS NES*, Dec. 10, 1991, translated from Kol Yisrael, December 6, 1991

¹⁰⁰*Wall Street Journal*, Sept 16, 1988. Schott was the subject of a parliamentary inquiry in the Bundestag in 1989.

¹⁰¹Jacques Delestapy, *Military Powers Encyclopedia*, Volume 4, p 282; Paris, 1989.

¹⁰²Telephone interview with the author, May 6, 1992.

¹⁰³Weekly economic report from the French Embassy in Damascus, Syria; undated, 1991.

¹⁰⁴Remarks by Philippe Delmas, Director of Atomic and Space Technology in the Cabinet of French Foreign Minister Roland Dumas, at a restricted forum in Paris on May 18, 1992 devoted to proliferation, at which the author was a speaker.

¹⁰⁵Reuters, Feb 1, 1991.

¹⁰⁶Source: Report by the French Embassy, Damascus, Syria, "Le marché Syrien des Produits Pharmaceutiques", Damascus June 9, 1989. In 1989 the public sector comprised approximately 30% of Syrian pharmaceutical production, the private sector occupied 10% of the market, with the remaining 60% covered by foreign imports.

¹⁰⁷Source: Institut Français des Relations Internationales.

¹⁰⁸CEDUST(Centre de Documentation Universitaire Scientifique et Technique); report by the commercial attachee at the French Embassy at Damascus, dated February 1989.

¹⁰⁹The Sagem deal was part of a government-to-government protocol signed in 1983 that was never executed because of financial difficulties; see Note 15.

¹¹⁰Report from the French Embassy, Damascus, 'Poste d'Expansion Economique,' May 30, 1986.

¹¹¹The Middle East Military Balance, 1989-1990, Joseph Alpher, ed, Jaffee Center for Strategic Studies, Tel Aviv University, 1990; and Mednews archives.

¹¹²Josephe S. Bermudez Jr, "Syria's Acquisition of North Korean Scuds," *Jane's Intelligence Review*, June 1991, p 250.

¹¹³"Syrian government reportedly requests Chinese missiles," *Al-Qabas*, July 26, 1989, p. 20, 26, and Manama *Wakh*, quoted in *FBIS NES* July 31, 1989. A preliminary agreement to sell the M-9 to Syria was signed in May 1988, only days before the first flight test of the M-9 over the weekend of June 17-18, 1988.

¹¹⁴*New York Times*, Dec 10, 1989.

¹¹⁵David Twersky, "China arms Syria as Bush wavers: Assad Acquiring deadly M9 launchers," *The Forward*, September 27, 1991.

¹¹⁶Washington Post, June 19, 1991, p 22.

¹¹⁷William Safire, "Why are Chinese Missile Experts in Syria," *International Herald Tribune*, March 6, 1992.

¹¹⁸Interview with Israeli officials, Tel Aviv, April 4, 1992.

¹¹⁹Damascus radio, translated by *FBIS NES*, March 30, 1990.

¹²⁰Bill Gertz, "North Korean Scuds added to Syrian Arsenal," *Washington Times*, 13 March 1991; and Joseph S. Bermudez Jr, "Syria's Acquisition of North Korean Scuds," *Jane's Intelligence Review*, June 1991, p 250; Steven Emerson, "The Postwar Scud Boom," *Wall Street Journal Europe*, July 11, 1991.

¹²¹Bill Gertz, *Washington Times*, June 4, 1991, P.4.

¹²²See Patrick Clawson's excellent analysis of the relationship between aid and Syrian military spending, "Unaffordable Ambitions: Syria's Military Build-up and Economic Crisis," *Policy Paper* Number 17, The Washington Institute for Near East Policy, 1989.

¹²³Wolf Blitzer, CNN, May 8, 1992.

¹²⁴William Safire, "Why are Chinese Missile Experts in Syria," *International Herald Tribune*, March 6, 1992.

¹²⁵The official, Bradley Gordon, is ACDA's Assistant Director. He was speaking at a Sept 1991 meeting at the National Academy of Sciences in Washington, DC (Quoted by Leonard Spector, "Nuclear Proliferation in the Middle East," *Orbis*, Spring 1992, p 189.)

¹²⁶Richard Kessler, "Argentina to ink research reactor deal soon with Syria, says CNEA", *Nucleonics Week*, May 31, 1990

¹²⁷Some sources indicated during the course of this investigation that discussions were underway between Syria and Argentina. IAEA spokesman, David Kyd, reconfirmed on June 12, 1992 that "the Agency has never been informed of this potential contract, but can only surmise that it has not been concluded" since Syria had recently signed a comprehensive safeguards agreement with the IAEA (in Feb 1992).

¹²⁸"Syria raises tension with nuclear plan," by Richard Beeston in Jerusalem and Catherine Sampson in Peking, *The Times* (London), Nov 30, 1991

¹²⁹Translated by *FBIS NES*, Nov 29, 1991 from *Davar* of the same date.

¹³⁰*Nucleonics Week*, Safeguards concerns delay IAEA approval of Syrian reactor by Mark Hibbs, Bonn, Neal Sandler, Jerusalem.

¹³¹*FBIS NES*, January 24, 1992 from Hamburg DPA, January 23 1992.

¹³²*FBIS NES*, Feb 10, 1992, quoting Damascus SANA, Feb 9, 1992.

¹³³*FBIS NES* Feb 10, 1992 from Damascus Syrian Arab Republic Radio Feb 10, 1992 and SANA Feb 10, 1992

¹³⁴Nuclear experts we interviewed estimated that the high-grade phosphates mined in Syria are capable of yielding between 200 to 300 grams of natural uranium per ton of phosphate ore. According to MEED, 31 May 1991, companies bidding for the \$500 million Palmyra project were: Simon Carves (UK), Technoexport (Czechoslovakia), Techmaslexport (Russia), Tecnicas Reunidas (Spain), Industrialexport (Rumania), and an unknown Indian concern.

¹³⁵CIA Director Robert Gates told Congress on Jan 15, 1992 that the latest CIA estimate put Libyan chemical agent production at 100 tons.

¹³⁶"The Secrets of Sebha," Granada TV "World in Action" series, transcript issued Apr 2, 1991.

¹³⁷ABC News Senior European correspondent, Pierre Salinger, was taken with a camera crew to the Rabta plant by the Libyan authorities in December 1991. Salinger said he saw no sealed areas inside the plant, which appeared to be "80 to 90% complete."

¹³⁸"The Secrets of Sebha," Granada TV "World in Action" series, transcript issued Apr 2, 1991.

¹³⁹Piltz was no newcomer to the Middle East. He had been hired by Egyptian president Nasser in 1962 to work on Projekt Wasserfall, which aspired to equip Egypt with V-2 type guided missiles with West German assistance. Israel's Mossad is said to have helped to abort the program, by targeting German rocket scientists in clandestine attacks.

¹⁴⁰Geerd Greune, "Bundesdeutsche Raketen in Zentralafrika" in *Forum: Zeitschrift für transnationale Politik*, Roland Vogt, Berlin (West Germany), April 1979, p. 49-51.

¹⁴¹Ibid. Arcomsat was later known as Arabsat, and was launched by a European Ariane rocket in the late 1980s.

¹⁴²Jacques de Lestapis, *Military Powers Encyclopedia*, Volume 2, Paris, 1987, p 78.

¹⁴³John Cooley, *Libyan Sandstorm*, Holt Reinhart and Winston, New York, 1982; pp 235.

¹⁴⁴Ibid, p 236-238. Although the Swedish government claimed it was breaking off the military training deal in January 1982, sources we consulted within Swedish industry in May and June 1992 said that Libyan technicians were still being trained in Sweden today.

¹⁴⁵Interview with Eckhard Fischer, Bonn, June 10, 1992.

¹⁴⁶Mednews, Nov 30, 1987 (Vol 1, No 5).

¹⁴⁷Telephone interview with Wilhelm Dietl, June 26, 1992.

¹⁴⁸Reported by the Italian daily Corriera della Sera, Sept 2, 1991).

¹⁴⁹Hamburg DPA, Sept 5, 1991.

¹⁵⁰Some 400 Libyan technicians were trained in advanced electronics assembly and trouble shooting techniques by Thomson from 1978-1982, according to *Military Powers* (opcit), p 67. In 1983 and 1985, Thomson-CSF sold the Libyan Air Force its Dalia 500 and DR-2000 electronic countermeasure pods.

¹⁵¹Hamburg DPA, Jan 22, 1992; Mednews, March 30, 1992.

¹⁵²Steve Weissman and Herbert Krosney, *The Islamic Bomb*, Times Books, New York, 1981; p 56.

¹⁵³"Libya abandons plans for first unit," *Nuclear Engineering International*, Apr 1986; p 6; Jerome Dumoulin covered the Chirac visit in "La France fournirait à la Libie une centrale nucléaire," *Le Figaro*, 22 March 1976; see also *The Undeclared Bomb*, by Leonard S. Spector, The Carnegie Endowment, 1988; p 198.

¹⁵⁴*The Islamic Bomb*, opcit, p 57.

¹⁵⁵Ibid, p 212. Le Monde had put the figure at 1,000 tons for the first quarter of 1981 alone. The figure of 1200 tons was suggested by African affairs specialist, Jacques de Lestapis, in an interview in Paris in 1986.

¹⁵⁶"India says Libya Tried to Buy Bomb," *International Herald Tribune*, Oct 11, 1991 (original in *NY Times*).

¹⁵⁷*The Undeclared Bomb*, opcit, p 198.

¹⁵⁸Mark Hibbs, *Nucleonics Week*, Oc 12, 1989; quoted by Spector, *Nuclear Ambitions*; p 179.

¹⁵⁹Mark Hibbs, *Nucleonics Week*, Nov 8, 1990.

¹⁶⁰Interview with the author with Jacques de Lestapis.

¹⁶¹*Athens News*, Oct 12, 1989.

¹⁶²"Libya said to Woo Russian Atom Scientists," Associated Press, Jan 9, 1992

¹⁶³Vitaly Kozlikin, "Russian's £60,000 nuclear job with Gaddafi," *Sunday Express* (London), Jan 19, 1992.

¹⁶⁴Gilles Millet, "Les Tribulations de Tannoury, Milliardaire et Trafiquant d'Armes," *Libération*, June 2, 1986. Tannoury's escapades were first revealed by the Iraqi newspaper, *Al Watan al Arabi*.

¹⁶⁵Interview with Jacques de Lestapis, Paris, June 26, 1992.

¹⁶⁶*The Undeclared Bomb*, ibid, p 200-201. Leonard Spector obtained several hundred pages relating to this case from the office of the general counsel of the CIA in 1987, through a Freedom of Information Act request. He explained this case in detail in a Feb 24, 1987 hearing before the Senate Government Affairs Committee dedicated to Nuclear Non-Proliferation.

¹⁶⁷Telephone interview with Charles Hernu in Villeurbanne, France, June 5, 1986.

¹⁶⁸Interviews with Vladimir Lopatin, Deputy Chairman of the Russian State Military-Industrial Commission (VPK), Rome, June 15-16, 1992. Cf Kenneth R. Timmerman, "Russia Needs Export Controls Now," *Wall Street Journal Europe*, June 23, 1992.

¹⁶⁹"Strengthening the Export Control Licensing System," a report by the Commerce, Consumer, and Monetary Affairs Subcommittee of the House Committee on Government Operations, July 2, 1991.