

# Beating Plowshares Into Swords: Iraq's Defense Industrialization Program



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# Beating Plowshares Into Swords: Iraq's Defense Industrialization Program [REDACTED]

An Intelligence Assessment

This paper was prepared by [REDACTED] Office of  
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NESAS 90-10009  
July 1990

## Beating Plowshares Into Swords: Iraq's Defense Industrialization Program [REDACTED]

### Key Judgments

Information available  
as of 1 June 1990  
was used in this report.

Iraq is making significant gains in expanding its defense industries—one of President Saddam Husayn's main postwar goals. Iraq is developing, assembling, or producing nearly 100 types of major ground, air, and naval weapon systems, small arms, and munitions. The arms industry encompasses dozens of military and nominally civilian industrial organizations. Baghdad spends several billion dollars annually on military industries, and military and military-related industries probably employ as many as 500,000 of Iraq's labor force of 4.4 million. The defense industries program will help Iraq become one of the most industrialized countries in the Middle East by the end of the century. [REDACTED]

The development of missiles and nonconventional weapons is the defense industry's highest priority and is the program most at odds with US interests in limiting proliferation and in promoting regional stability. Moreover, Iraq's activities present significant problems for controlling US technology. Dual-use technologies can be easily diverted from civilian programs because Iraq integrates its civilian and military production facilities. [REDACTED]

Saddam Husayn probably perceives US criticism of Iraqi strategic weapons programs as an effort to undermine his regime, and he is likely to rebuff US pressure to end Iraqi efforts to acquire Western technology for strategic industries. Baghdad almost certainly views the unbridled acquisition of US and other Western technology as an important issue for relations between Iraq and the United States. Iraq would prefer to minimize damage to commercial relations, but it would probably discontinue servicing some of its \$2 billion debt to the United States if Washington applied sanctions in response to continued Iraqi export violations or weapons development. [REDACTED]

The Ministry of Industry and Military Industries directs and supervises the procurement and production responsibilities that are spread among numerous military and civilian production facilities. Under the leadership of Maj. Gen. Husayn Kamil al-Majid—perhaps the second-most influential man in Iraq—Baghdad is developing key managerial and technical skills. Its achievements in munitions production, chemical warfare, and missile development suggest Baghdad has capable top-level managers, scientists, and technicians. Iraq is increasing this cadre by expanding college and vocational study in management, engineering, and applied science. [REDACTED]

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Foreign companies have been instrumental in Iraq's defense industrialization program during the past decade. Large-scale assistance has provided necessary technology, equipment, and management techniques. Companies from at least 20 countries in Europe, Asia, and the Americas—including the United States—have been involved in all phases of Iraq's defense program. [REDACTED]


Iraq has established extensive clandestine procurement networks for foreign technology assistance, advanced industrial machinery, and weapon systems components. These networks use front companies and intermediaries to avoid controls on dual-use technologies and other sensitive material. [REDACTED]

Despite some problems with the size of its industrial base and with limited capital resources, Iraq's industrialization program is likely to maintain its current pace, providing greater self-sufficiency and attaining other Iraqi goals by the mid-1990s:

- Advances in ballistic missile production and nonconventional weapons would help maintain Iraq's military superiority over Iran and narrow slightly the technological gap with Israel.
- If deterrence fails, the size and scope of Iraq's industrialization suggest it wants to be prepared for a lengthy, large-scale war.
- The defense industries' demands for locally produced goods and the creation of a skilled labor pool will spur domestic production and economic growth, benefiting Iraq's economy.
- Increased defense production will allow Baghdad to boost its arms exports, although these sales probably will earn more good will than revenue.

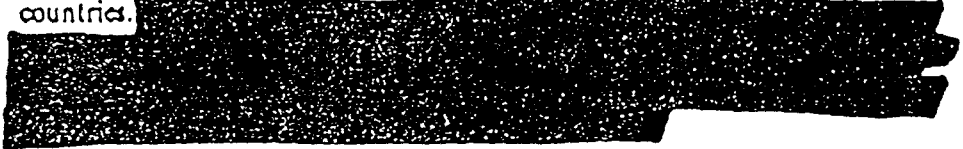
Iraq will continue to depend heavily on foreign suppliers for at least the next five years, and the technological gap between locally produced arms and foreign state-of-the-art weapon systems will remain wide. [REDACTED]

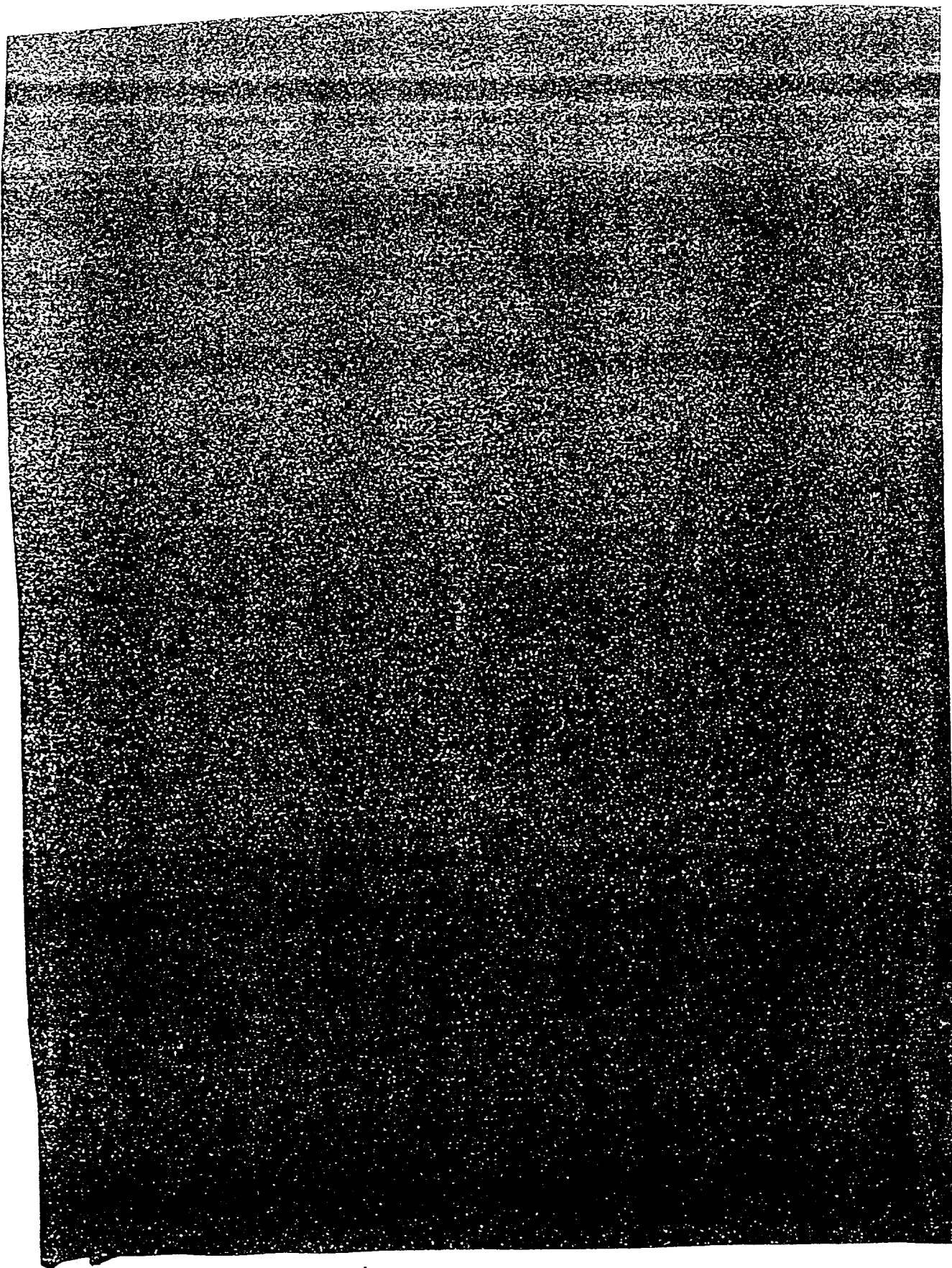
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Scope Note

This paper assesses Iraq's plans and capabilities for developing modern defense industries during the next three to five years. Significant reporting from all sources is available on the organization of Iraq's military industries, procurement operations, and development plans. Information on Iraqi manufacturing processes, technical training, and the number of foreign advisers in Iraq's factories is limited, however, and we cannot compare fully Iraq's capabilities with other developing or developed countries.





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## Beating Plowshares Into Swords: Iraq's Defense Industrialization Program

One of Iraq's main postwar goals is the ambitious expansion of its defense industries. In May 1989, Minister of Industry and Military Industries Husayn Kamil al-Majid claimed publicly that Iraq was implementing a defense industrialization program to cover all its armed forces' needs for weapons and equipment by 1991. He also said the program was intended to provide all of Iraq's basic industrial supplies—such as metal, pipes, and water pumps—from indigenous sources. The Ministry of Industry and Military Industries says it intends to develop other civilian fields in Iraq, including civil engineering; the production of electronic, textile, and other consumer goods; and the oil sector.

### Ambitious Goals

Iraq's desire for a large arms industry has grown during the past decade. Initial plans for defense industrialization date from the oil boom of the mid-1970s, but the war with Iran delayed implementation. President Saddam Husayn apparently believes an expanded arms industry will enhance Iraqi prestige as well as help solve security problems identified during the war, such as the lack of reliable arms supplies. We believe the rapid growth of the Ministry of Industry and Military Industries and its bureaucratic and industrial components in the past three years indicates the importance placed by the regime on developing indigenous arms manufacturing capabilities.

Although Iraq's stated goals almost certainly are overly ambitious, we believe the regime recognizes its limitations and holds more pragmatic aspirations in private. Baghdad has significant advantages that make less grandiose, but still substantial expansion of its defense industries a realistic goal:

- It has ample supplies of cheap hydrocarbons to meet its energy needs and has placed a high priority on expanding its electrical generation capacity.

- Oil income—about \$14 billion in 1989—is likely to increase gradually during the next few years, making extra money available for defense programs.
- Its large military can absorb relatively high levels of production. We estimate that, even after postwar demobilization is completed in the next few years, Iraq will have between 400,000 and 500,000 men in its Army, an Air Force of at least 750 combat aircraft, and a Navy with at least 10 warships.
- A potential supply of customers for arms exports already exists. Some Arab countries have expressed interest in buying Iraqi arms, and Iraq's modest military aid programs may develop into sales programs.

### Pursuing Expanded Arms Production

Iraq apparently has decided that a broad-based arms industry is the key to military self-sufficiency. Its current efforts and future plans involve nearly every type of modern ground, air, or naval weapon system. We estimate the Ministry of Industry and Military Industries is developing, modifying, assembling, or producing nearly 100 types of major weapon systems, small arms, and munitions. Many of these systems were displayed publicly at military exhibitions in Baghdad in October 1988 and April 1989. The majority of Iraq's larger and more sophisticated weapon systems are still in the development stage, and only prototypes or mockups were displayed at the exhibitions.

Most Iraqi products rely on older technologies, although more sophisticated technology increasingly is being incorporated into these weapon systems and their components. Baghdad has not successfully demonstrated an indigenous design and development capability for a total major weapon system, in our judgment. Licensed assembly and coproduction and



## Hard Lessons, High Hopes

"Naturally, the major powers are upset when a country like Iraq produces arms and when it reduces, and I do not say ends, its dependence on them. They get upset . . . because their ability to influence the independence and decisionmaking of countries politically will be less than when these countries were importing their war needs from them."

Saddam Husayn

December 1989 (N)

The security, political, and economic motivations behind Baghdad's ambitious programs are similar to those traditionally associated with developing countries. The Iraqis, however, appear especially driven because of their experiences during the eight-year war with Iran, which cost Iraq more than 125,000 dead.

Greater security and self-sufficiency in supplying its military with weapons almost certainly are Iraq's main goals. The Iraqis were stung during the war by arms embargoes by many countries—including briefly by its main supplier, the Soviet Union. Baghdad also resented paying the higher prices charged by those willing to sell armaments. Recent public statements by Saddam Husayn have made clear his desire to lessen Iraq's vulnerability to foreign decisions.

Baghdad probably hopes that increased self-sufficiency will result in greater financial savings, preventing it from falling deeper into debt. Iraq was unprepared for its lengthy war with Iran, and we estimate that during the conflict Baghdad spent an additional \$27 billion dollars on armaments. This spending helped drain Iraq's foreign exchange reserves and caused it to borrow heavily.<sup>a</sup> Baghdad still views Iran as a threat, and the size and scope of its industrialization

<sup>a</sup> Iraq's foreign exchange reserves fell from \$25 billion in 1980 to \$2 billion at the end of the war. Iraq's non-Arab foreign debt rose from \$5.6 billion to about \$45 billion at the end of 1988. Iraq has an additional \$37 billion in "soft" loans from the Gulf Arab states, which are unlikely to be repaid.

program suggest it is preparing for supporting another large-scale and lengthy war.

In the wake of its victory in the war, Baghdad views its progress in defense industrialization—particularly with more advanced weapons—as a source of national pride, in our judgment. Saddam may hope that arousing nationalist pride with occasional displays of Iraq's improving capabilities will reduce popular resentment over the slow pace of economic recovery, the lack of a formal or definitive settlement with Iran, and the continued concentration of political power within his family.

Iraq also intends its defense industries programs to provide significant foreign policy benefits, in our judgment. The emphasis on the advanced technology programs reflects their usefulness in reminding Iran and Israel of Iraq's growing capabilities and in providing leverage over militarily weaker Iraqi opponents and competitors such as Syria, Egypt, and Saudi Arabia. Baghdad probably believes that its weapon programs—by carrying the Arab banner in the technological arms race with Israel—strengthen its political position in the Arab world. Moreover, Iraq has given surplus weapons and munitions to countries such as Jordan, North Yemen, Sudan, and Mauritania, and it may believe that its future production will allow continued military aid with its attendant political benefits.

Economic motivations may grow as Iraq widens its strategic advantage over Iran. Iraqi officials have stated publicly that the main economic goals of defense industrialization are import substitution and the technological stimulation of civilian industries, and they claim successes in both areas. The Iraqis have emphasized the export potential of the arms industries, referring to Iraq as a source of weapons for other Arab and friendly states. In our judgment, Baghdad believes its expanding defense industries will provide more economic options for developing and using its industrial and manpower assets most effectively.

## Iraqi Conventional Weapon Systems and Programs

**Strategic Systems.** Iraq is working on at least five types of short- and medium-range ballistic missiles. It also is developing a space launch vehicle and various types of short-range missiles and rockets.

**Aircraft.** Iraq has modified Soviet-supplied IL-76 transport aircraft to serve as airborne early warning and control system aircraft and as fuel tankers. It also has modified Soviet-built MiG-23 and Su-22 aircraft for aerial refueling and to carry Western-style ordnance, while Mirage F-1 aircraft have been modified to carry Soviet-style ordnance. The Ministry of Industry and Military Industries is pursuing coproduction deals for trainer and fighter aircraft and helicopters.

**Ground Equipment.** Iraq probably is self-sufficient in small arms and munitions production. It has modified numerous armored vehicles by adding more modern fire control systems, larger main guns, or additional armor. The Iraqis produce or assemble under license several types of artillery pieces and multiple rocket launchers, and Baghdad is developing its own howitzers from foreign-supplied components assembled in Iraq. The Ministry of Industry and Military Industries produces a few types of antiaircraft guns, control systems, and radars.

**Naval Systems.** Iraq has modified small patrol boats with various types of weapon systems. It also manufactures several types of naval mines and is developing an antiship missile that appears to be based on

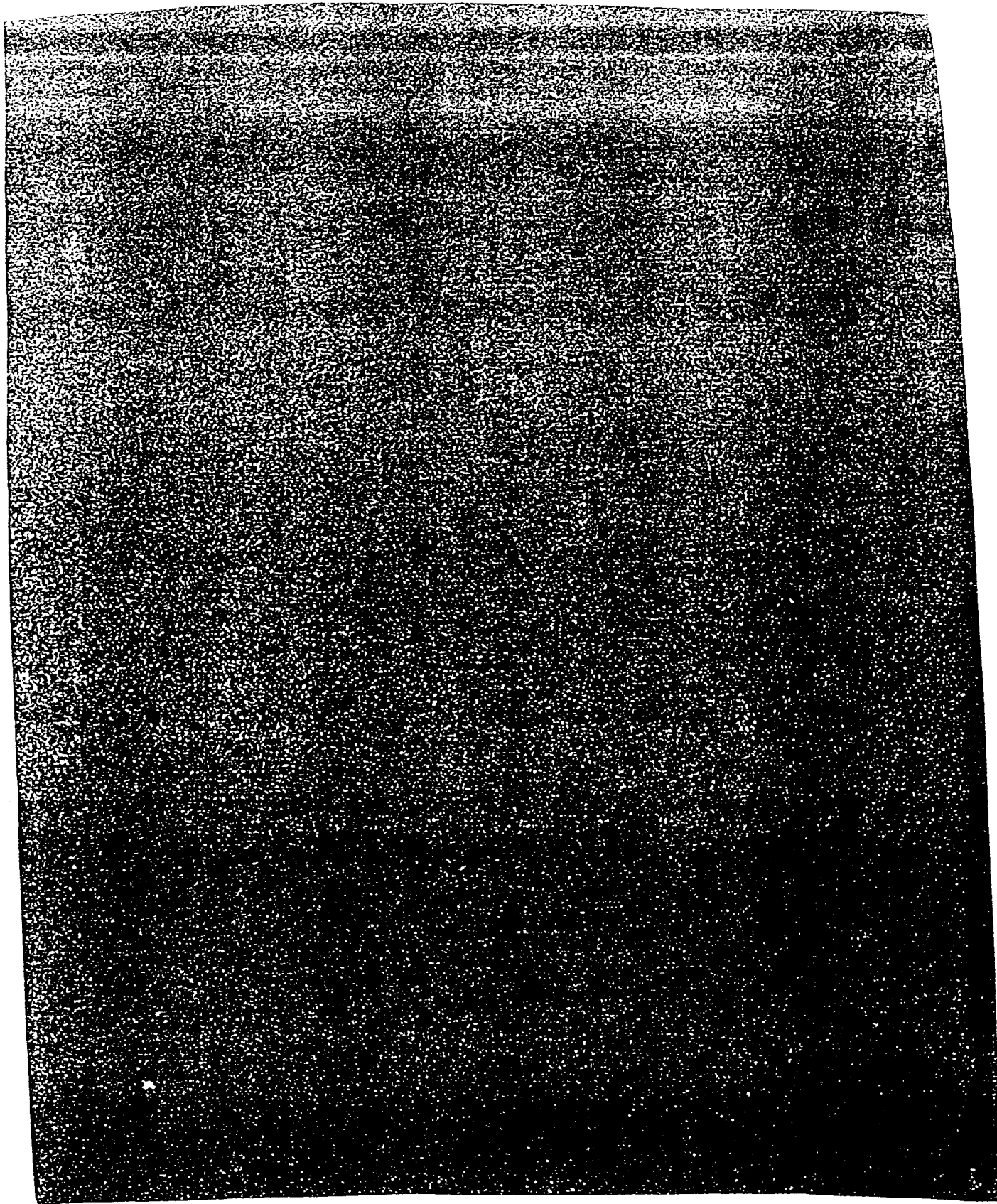
the Chinese-built HY-2 Silkworm antiship missile. The Ministry of Industry and Military Industries is considering a program to build minisubmarines.

**Miscellaneous Production.** Iraq produces or assembles remotely piloted vehicles. In addition, the Ministry of Industry and Military Industries has modified several air-launched missiles for different missions, and it manufactures a wide variety of bombs. Iraq's military electronic production facilities manufacture radars, radios, antennas, mine detectors, and relatively sophisticated electronic circuit boards, semiconductors and transistors, and integrated circuits.

**Nonconventional Weapons.** Baghdad produces the blister agent mustard and several types of nerve agents and has put these agents into aerial bombs, rockets, artillery shells, and probably missile warheads. Iraq also produces large quantities of the biological warfare agents botulin toxin and anthrax bacteria and will probably achieve a limited operational capability by the end of 1990. Although we have not confirmed any nuclear-weapons-related facilities in Iraq, Baghdad's procurement activities strongly suggest the existence of a nuclear weapons program. In our judgment, Iraq has the technical competence, when combined with clandestinely obtained foreign technology or assistance, to develop a nuclear weapon by the middle-to-late 1990s.

adaptations of foreign weapon systems and technologies dominate Iraqi production of major weapon systems. Iraq also is manufacturing increasing amounts of spare parts and electronic components for weapon systems in its inventory. The weapons produced completely by Iraq are limited to small arms, mortars, small boats, and munitions.

Iraq does not release production figures for its defense industries, but we believe high-volume production exists in only a few areas. Major weapon systems that appear ready for full-scale production, such as Iraq's



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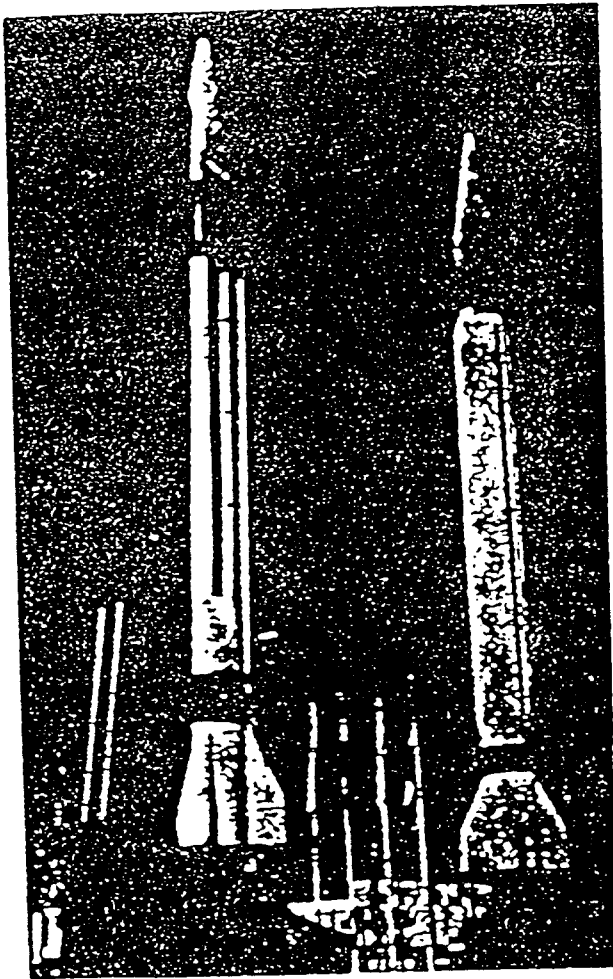


Figure 1. The Al Husayn and Al Abbas surface-to-surface missiles.

Tiger G radars, the Sijil multiple rocket launcher, and some of the Saddam-series artillery pieces, have not been seen in significant numbers in storage depots near the production facilities. We believe pressure to increase production of most systems is slight because Iraq's military has surplus weapons in its inventory. Slower production may also reflect an Iraqi decision to pursue—within the constraints of its capabilities—quality over quantity.

Iraq apparently plans to develop its arms industries to support likely wartime demands. Capacity has been reached at some munitions and electronics factories, for example, and Iraq is trying to increase production rates by adding shifts and new assembly lines at

various munitions plants. We believe Baghdad will soon have a surge capacity for most types of small arms and tank and artillery ammunition.

### Organizing for Success

Iraq has established a complex defense industries organization that encompasses not only military-related production facilities, but also state enterprises primarily devoted to civilian production. The Ministry of Industry and Military Industries directs and oversees the procurement and production responsibilities of subordinate offices, departments, and commissions. It also coordinates projects that often involve many other Iraqi and foreign organizations. Under the leadership of Saddam's son-in-law, Maj. Gen. Husayn Kamil al-Majid, the ministry has become an increasingly powerful organization. Husayn Kamil's influence allows him to order other ministries, organizations, and independent committees to support the industrialization effort.

we believe Iraq devotes a considerable share of its financial and labor resources to its military industrialization effort. We estimate Baghdad spends several billion dollars annually on military industries. Iraq's 1990 budget allocates 53 percent of investment funds—equivalent to \$9.5 billion at the overvalued exchange rate—to industry, according to Iraqi press reports.<sup>1</sup> On the basis of Iraqi Government information on the size of Iraq's labor force and our estimate of the size of its defense industries, we speculate that military and military-related industries employ as many as 500,000 of Iraq's 4.4 million labor force.

### The Ministry of Industry and Military Industries

The creation of the Ministry of Industry and Military Industries in mid-1988 acknowledged and strengthened existing ties between defense and civilian industries. The ministry wedded the Military Industries

<sup>1</sup> Iraq's overvalued official exchange rate makes it difficult to quantify the amount Baghdad allocates to industry in US dollars. Examination of the share of spending allocated, however, underscores the importance Iraq attaches to industry.

Commission and the nominally civilian-oriented Ministry of Industry and Minerals. The new ministry almost certainly reflected Baghdad's emphasis on improving the overall management of industry.

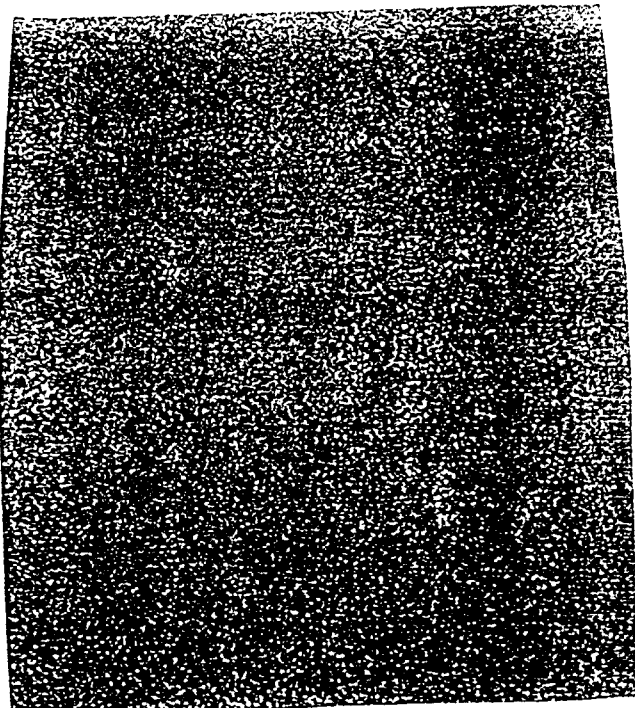
The ministry is nominally broken down into a civilian side, headed by Deputy Minister Adnan al-Ani, and a military side, headed by Deputy Minister Lt. Gen. Amir al-Sa'di, according to a reliable source of the US defense attache in Baghdad. The ministry's subordinate defense and civilian organizations apparently are closely integrated.

The ministry has several offices that are heavily involved in procuring foreign technology and assistance for the defense industrialization program.

- The Technical Corps for Special Projects serves as Iraq's focal point for defense-related industrial construction and civil engineering and commercial contacts between Iraqi enterprises and foreign suppliers.
- The State Organization of Technical Industries serves a similar role in coordinating and facilitating the involvement of Iraqi organizations in industrial development. It also serves as a common address and clearinghouse for Iraqi enterprises and some foreign suppliers.
- The Military Production Authority apparently secures foreign participation in the industrialization program.

So-called state establishments are the central administrative organizations and production facilities. Some state establishments—sometimes called enterprises, organizations, or general establishments—are responsible for the production of several types of weapon systems or components and control facilities at several locations. Many facilities are large and have well-planned layouts for production lines, support buildings, utilities, and housing. Foreign access to Iraqi plants is limited, but newer factories apparently are fairly modern and well equipped. We believe Iraq had to emphasize automation in its new plants because of wartime demands on

labor and the shortage of skilled personnel. State establishments usually have research facilities as well.



The close integration of the defense and civilian industrial sectors almost certainly is intended to allow use of facilities by both and ultimately to diversify the defense industry's base for civilian goods production. The Ministry of Industry and Military Industries has tried to fulfill Saddam's public instructions that Iraq maximize its limited technical resources by "making use of civilian industry for military purposes ... and military industry for civilian purposes by using [their] surplus potential."

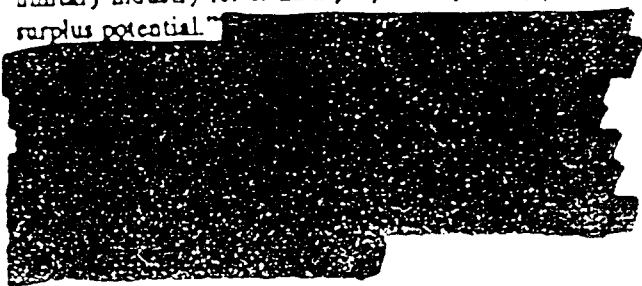
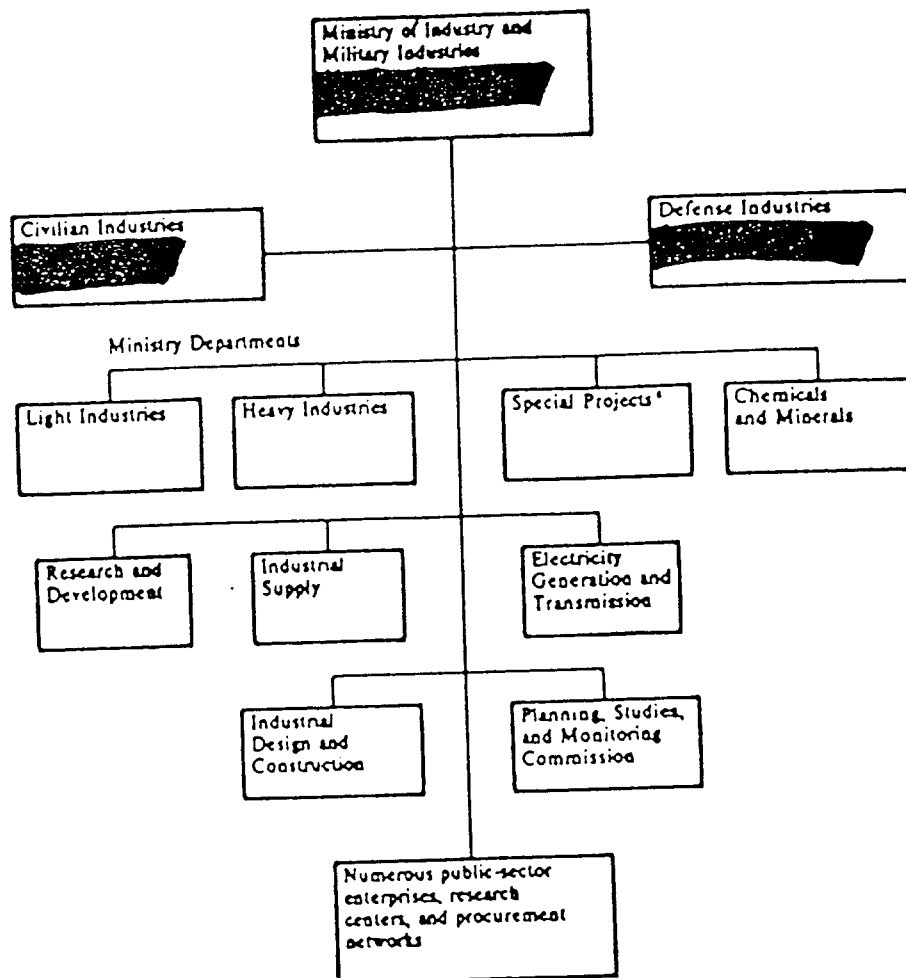


Figure 4  
Organization of Iraq's Military Industrialization Effort



\* The Special Projects office includes the Technical Corps for Special Projects, the Military Production Authority, and probably the entity known as SAFAN. The State Organization for Technical

Industries also is closely tied to the Special Projects office but may be on par with other state organizations and public-sector enterprises.

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We believe Baghdad exploits the ministry's civilian functions to facilitate the covert procurement of foreign technology and equipment for Iraq's military programs. Many nominally civilian firms legally acquire equipment that probably is used to support arms production. The ministry's military-civilian structure technically allows it to meet some stringent foreign licensing requirements while diverting equipment and technology to its arms factories. [REDACTED]

Iraq has established extensive procurement networks for foreign technology assistance, advanced industrial machinery, and weapon system components. These networks use front companies and intermediaries to avoid controls on dual-use technologies and other sensitive material. [REDACTED]

[REDACTED] In March 1990, Iraqi Airways employees were arrested in London as part of a US-UK sting operation for their role in buying and transporting to Iraq electronic capacitors used for nuclear triggers. [REDACTED]

#### The Vital Component: Foreign Assistance

Iraq has required large-scale foreign assistance for the progress in its defense industrialization program during the past decade. Foreign private and state-owned companies have provided Iraq with the technology, equipment, and management techniques to move quickly from basic to more sophisticated weapons assembly and production. Baghdad also continues to rely on some foreign personnel—particularly engineers and consultants—in its established facilities. [REDACTED]

We have identified companies from at least 20 countries in Europe, Asia, and the Americas—including the United States—involved in various phases of Iraq's defense industrialization program:

- State-owned companies from Yugoslavia and France have provided the most assistance in building facilities and in manufacturing weapons during the past eight years.

- Private West German firms probably have played a critical role in Iraq's high-priority missile and chemical warfare programs.

- Other companies heavily involved in Iraqi arms projects come from Austria, Argentina, Belgium, Brazil, Chile, China, Egypt, Switzerland, and the United Kingdom, according to press reports. Since late 1989 the Iraqis have been trying to increase technical and scientific cooperation with India and probably Japan.

- The Ministry of Industry and Military Industries has received computers and general electronic testing equipment from US companies through its clandestine procurement network.

- The Iraqis are increasing their use of international consortiums to procure equipment and technology, to diversify sources, and, as necessary, to avoid export controls or unwanted attention.

We believe the Iraqis will deal with any source that can provide the technology they need, but they prefer Western technology. [REDACTED]

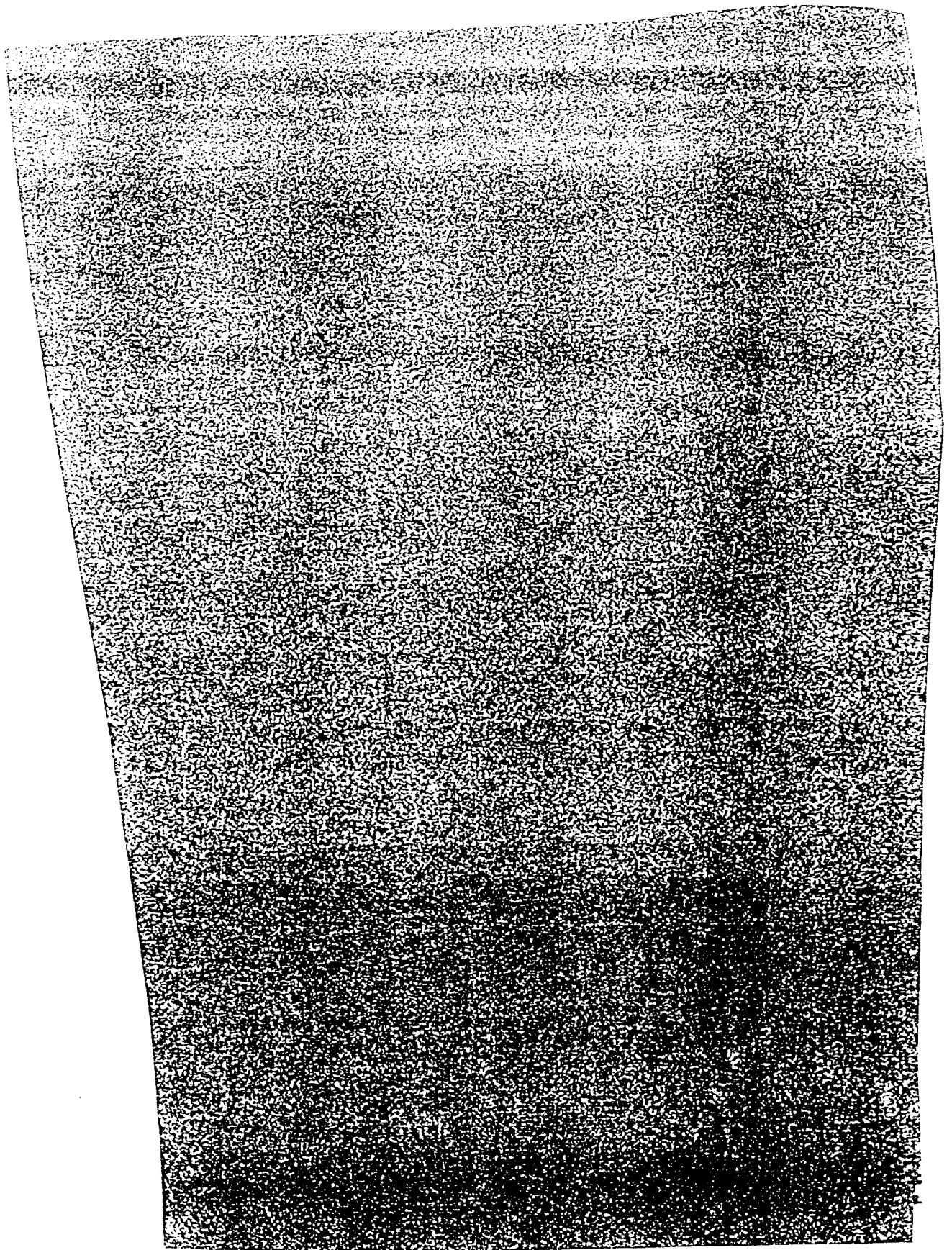
Diversification of suppliers has been a key goal of Iraq's industrialization effort, in our judgment, and this accounts, in part, for the large number of countries involved. Iraq probably believes that numerous sources improve its bargaining position and avoid overreliance that might jeopardize progress in specific areas. For example, Baghdad has been concerned that political developments in Eastern Europe might harm military supply agreements. [REDACTED]

[REDACTED] We believe the Iraqis are always looking for new sources of military supplies or production equipment that can provide financing when debt disputes cause existing suppliers to refuse to advance new credits. [REDACTED]

#### Managerial and Technical Skills Improving

Iraq's achievements in fields ranging from munitions production to chemical warfare and missile development suggest it has a cadre of capable top-level







## *Iraq's Extensive, but Troubled Covert Procurement Networks*

We believe Iraq's efforts indicate it is willing to go to great lengths to avoid international restrictions on the acquisition of high technology. As a result of Western restrictions on technology transfers, Iraq has established international procurement and financial networks to acquire covertly equipment and technology.

US-British sting operation prevented the illegal export of nuclear weapon triggering components by the front company EUROMAC and Iraqi Airways to Iraq in March 1990. Components for Iraq's long-range artillery or "supergun" program were seized in several countries, including the United Kingdom, Greece, Italy, Turkey, and West Germany.

[REDACTED]

Since 1987, business and banking ties and joint ventures have been established with banks, firms, or subsidiaries in France, Italy, Switzerland, the United States, and West Germany. The companies bought have been those that manufacture or can quietly acquire components or equipment Baghdad needs. The Iraqi holding companies, in turn, have set up front companies to acquire equipment.

The reported ties between Iraqi-based organizations, Iraqi Airways, and a wide assortment of companies have made it difficult for them to operate covertly. It may make some elements of the networks targets for hostile governments. For example, Gerald Bull was murdered in March 1990 after press reports linked his company, Space Research Corporation, to Iraq's procurement network and its strategic weapons programs. Officials of Space Research Corporation and its subsidiaries claimed they were closing their businesses in April.

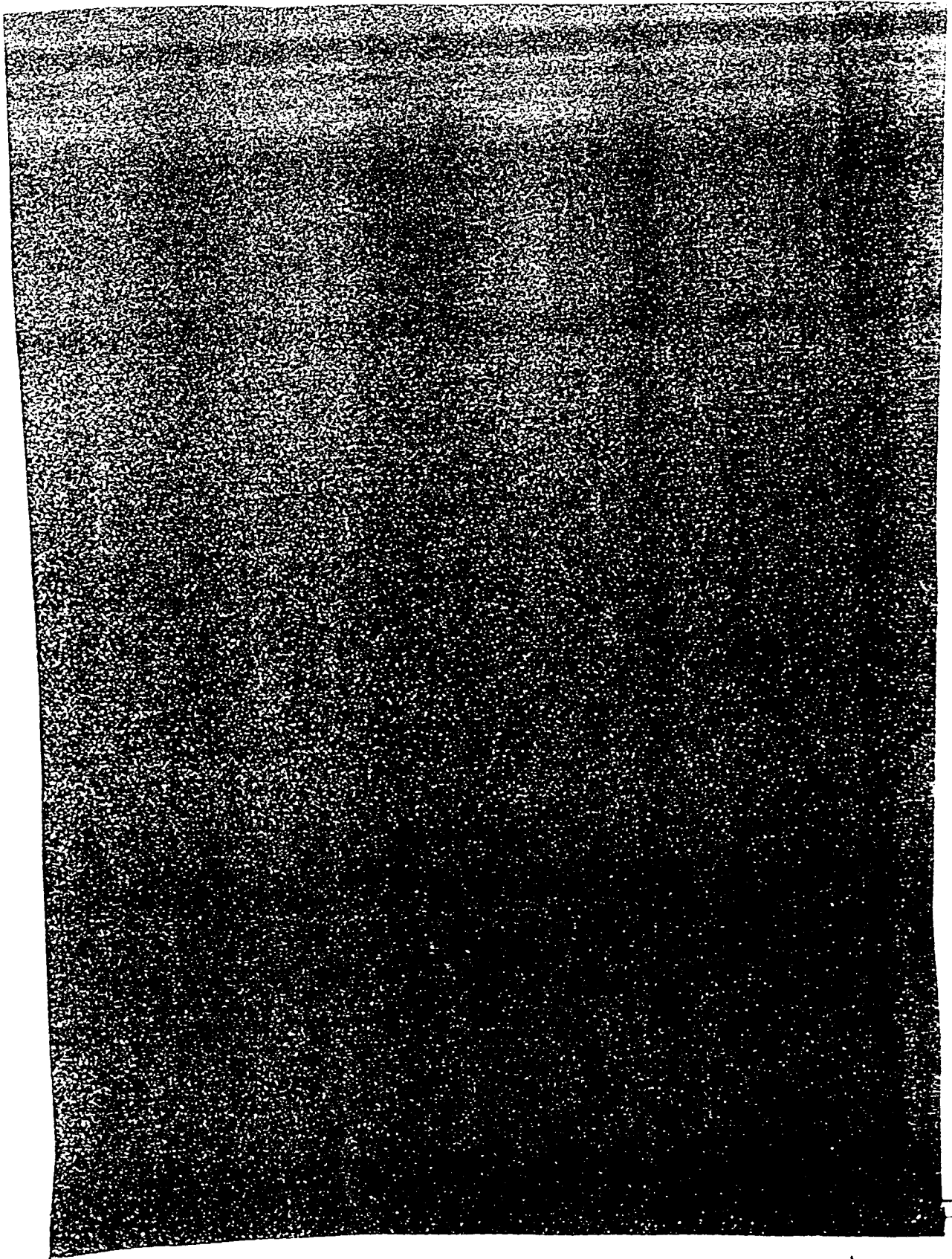
Iraq is unlikely to abandon these efforts despite the increased scrutiny. Baghdad began to develop new holding companies and front organizations in early 1990, and greater efforts in this area are likely.

Large parts of Iraq's network have been uncovered by press investigations in 1989 and actions by export control officials in Western Europe this year. A joint

managers, scientists, and technicians involved in the defense industrialization program. This cadre is expanding rapidly, in our judgment, and by the mid-1990s Iraq should be able to correct many of the managerial and skilled manpower problems that currently plague its defense industries.

[REDACTED]

Many of the ministry's top managers are military officers who, like Husayn Kamil, are willing to give strong directions to their offices. Because of their past successes, Husayn Kamil and his lieutenants apparently have been given unprecedented authority within the government to accomplish their goals.



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We believe earlier Iraqi efforts to improve the talents of its middle managers and production workers were at least partly successful as demonstrated by increases in production in some areas and in the research and development of advanced technological systems. For example, officials of a Swedish-US consortium working with Iraq on heavy truck manufacturing told the US Embassy that the firm had to rework its proposals because higher than expected Iraqi competence reduced the amount of assistance needed.

[REDACTED] Iraqi technicians and engineers in the high-priority missile programs are knowledgeable about and capable with state-of-the-art propellant manufacturing equipment and with specialized technology used for missile nozzle production.

Iraq is improving in other less critical manufacturing areas:

[REDACTED]

[REDACTED] businessmen were impressed by the Iraqis' ability to absorb manufacturing technology, and they commented [REDACTED] that the Iraqi education system was apparently turning out people competent enough to operate sophisticated equipment involved in producing trucks.

The regime has used financial incentives (pay, bonuses, and housing), increased supervision of factory production schedules, and greater discipline in lax factories—at times with harsh penalties for failure—to speed improvements in production and development, according to US officials.

Some managerial and skilled manpower problems have not been overcome. For example, Iraq's managerial and technical record at the state enterprise and factory floor level is mixed. We believe that, until corrected, the shortcomings of Iraq's middle-level managers and technicians will handicap the progress of the industrialization program:

[REDACTED] In mid-1989 an Iraqi-requested survey of one of its munitions factories by an [REDACTED] technical team concluded that output suffered from sloppy workmanship and an inability to adhere to technical designs in the production process—a result of poor supervision and the lack of skilled workers.

[REDACTED] that the major explosion at the Al Qa Qaa State Establishment munitions facility in September 1989—the second in as many years—was the result of poor safety standards and handling procedures.

[REDACTED] businessmen were critical of some Iraqi managers and used their weaknesses as an excuse to delay granting licenses to produce French air-to-surface missiles in late 1988, according to an untested source [REDACTED]

Iraq probably lacks sufficient skilled personnel to operate most of its newer arms factories at more than minimal levels of production without continued foreign assistance. Most Iraqi programs require much foreign assistance to train and supervise Iraqi personnel. Many joint agreements often include the provision of foreign supervisory personnel even after the facilities are turned over to the Iraqis.

[REDACTED] They apparently are particularly inadequate in completing or following designs.

We believe Iraq will continue to concentrate on modifications to major weapon systems until it increases its pool of managers and skilled labor and develops the infrastructure necessary for large-scale assembly and production. The Iraqis have shown themselves adept at modifying existing systems and are developing experience in integrating various subsystems onto a single chassis or airframe. This experience will probably result in establishing the design capabilities the Iraqis currently lack.

Industrialization's demands probably have led Iraq to improve its system of management and technical training. According to a contractor study, Iraq is emphasizing business management, engineering, and applied science in its major universities and technical institutes. Despite the demands of the war, Iraq increased the annual number of college graduates from slightly more than 21,000 in 1980 to more than 26,000 in 1988. In addition, Iraq expanded its vocational school system from 193 to 356 technical and commercial schools—doubling the teaching staff in the process.<sup>1</sup> The success of these measures is evidenced by the increase in technical and commercial vocational school attendance, which jumped from 47,000 in 1980 to more than 136,000 in 1988. An additional 26,000 students were admitted to six new vocational schools that opened in 1989. According to Iraqi press reports, Baghdad has found it necessary to offer incentives to encourage Iraqi youths to attend these schools because of the low prestige accorded to production workers and the technical schools in Iraq.

#### Impediments to Progress

We believe the small industrial base from which Iraq is starting and the competition for capital to support its programs have combined to prevent defense industrialization from progressing more rapidly. Too many technologically demanding and resource-intensive projects are stretching Iraq's ability to support the expansion, in our judgment. Inefficient production techniques resulting from managerial and technical shortcomings almost certainly keep production costs high, while the acquisition of more sophisticated technology requires increasing amounts of capital.

#### Industrial Capacity

Iraq's shortcomings in steel and specialty metals production affect several programs. The Ministry of Industry and Military Industries cannot support the

<sup>1</sup> Iraq's vocational school system also includes agricultural schools, but these declined in number from 30 to 24 between 1980 and 1988, according to a contractor study.

domestic production of armored vehicles or chassis, large-caliber guns, or missile and aircraft airframes. Iraq has few operating plants and foundries and probably must buy most of its armor plate from abroad. For example, Iraq is trying to import metal products from Pakistan. In addition, the Iraqis have little experience with manufacturing high-temperature alloys or other special metals and must purchase these from foreign suppliers.

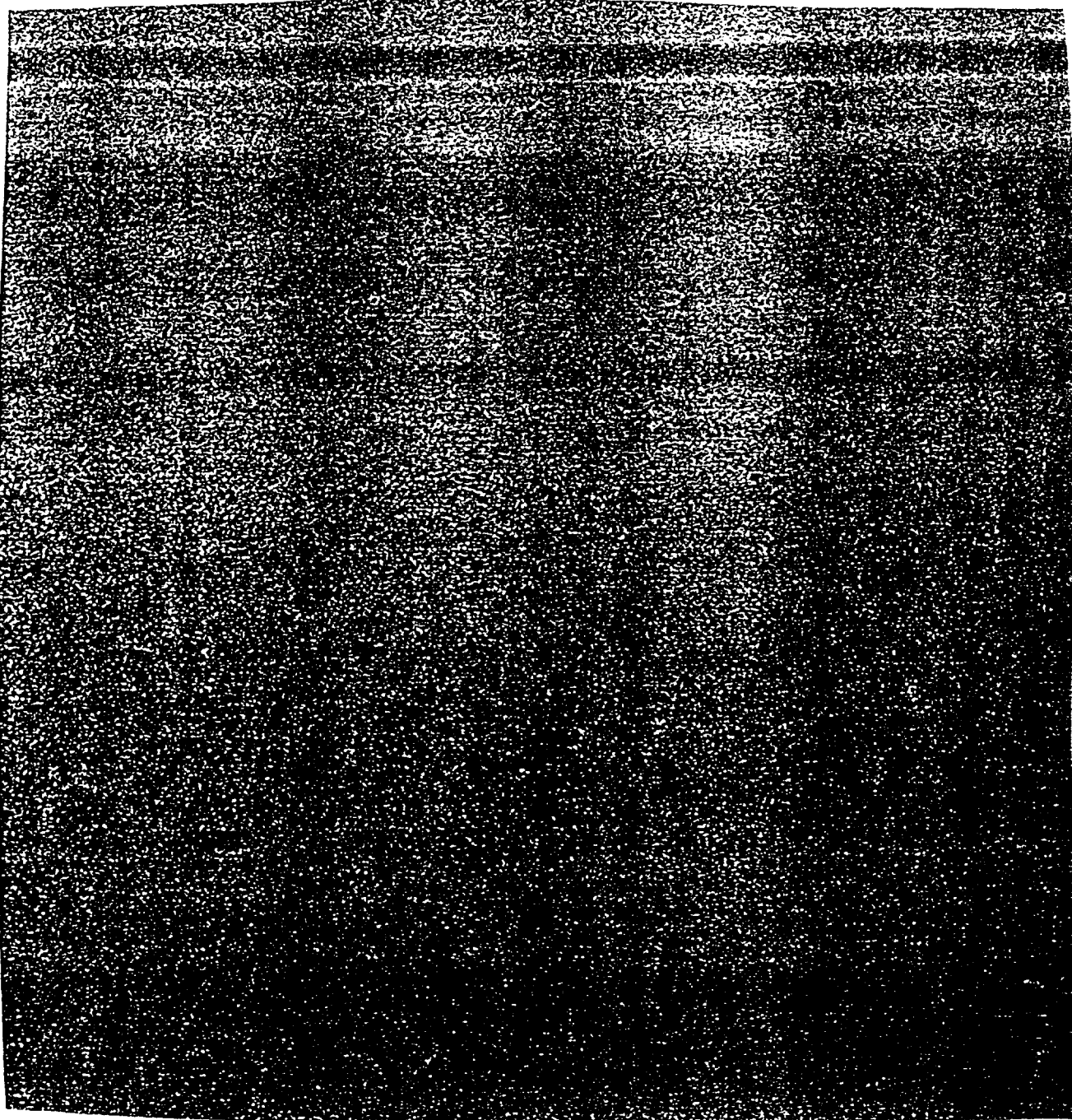
Iraq probably can alleviate many of these problems by the middle-to-late 1990s.

awarded a contract early last year to an Italian company to build a small steel mill near Taji—probably to support tank repair, assembly, or production—and is setting up an aluminum smelting operation. Iraq is expanding the Al Zubayr steel complex to increase production from approximately 300,000 tons/year to at least 3 million tons/year. When the project is complete, Iraq will be able to manufacture alloy steel there.

Iraq has made significant progress in the past two years in developing facilities to produce weapons components. Iraqi machining centers and tool and die factories have undergone significant expansion. Computerized lathes and other sophisticated production equipment have been acquired and put into use. Moreover, Iraq's electronics production facilities apparently are manufacturing components for an increasing number of weapon systems. These facilities are also adding new production and assembly lines.

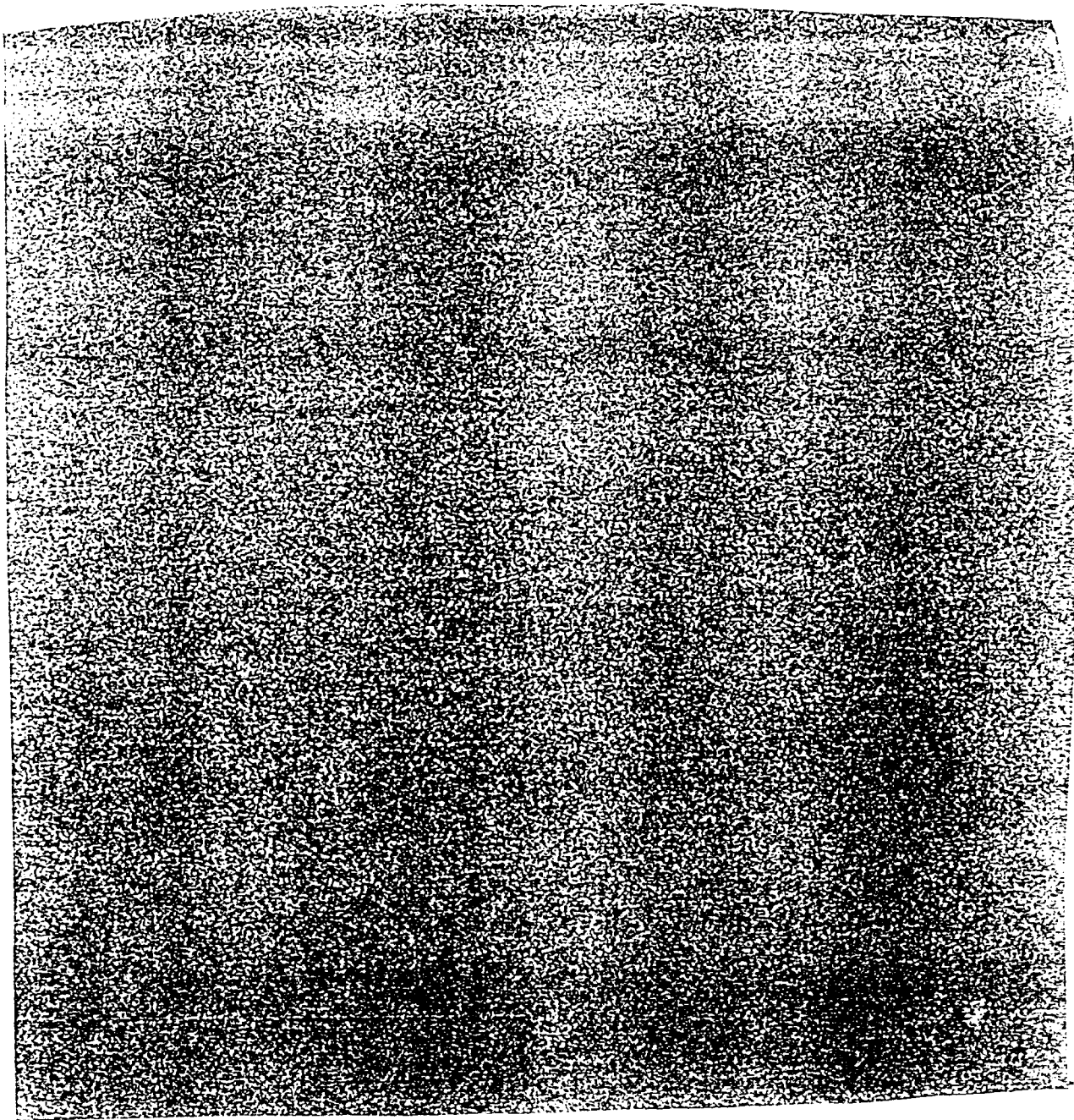
#### Financial Constraints

Iraq's large foreign debt and difficulties securing new credit have prevented Baghdad from proceeding as quickly as it would like on its industrialization program. For example, French and Chilean companies have withheld or delayed equipment deliveries because of overdue Iraqi payments.



██████████ Negotiations with French firms for aircraft assembly and other aviation-related projects have bogged down several times because Iraq failed to service its \$6 billion commercial debt to France, according to press reports. We expect Iraq's foreign exchange shortages will continue to cause problems for the ministry. ██████████

Iraq's oil earnings—although rising gradually—are not sufficient to meet all the plans on the ministry's books, and the demands of other Iraqi economic sectors require substantial amounts of foreign exchange. Baghdad must allocate some hard currency to



civilian projects to meet postwar expectations for improvements in living standards, in our judgment. As a result, the Ministry of Industry and Military Industries eventually may be forced to scale back some less important military projects.

#### Outlook

Our belief is that the postwar program will involve a significant increase in civilian production and consumption, and a corresponding decrease in military production and consumption.

*[Handwritten signature]*

defense industries will provide greater self-sufficiency as additional amounts of locally produced components and systems enter Iraq's military inventory. We believe import substitution and the technological stimulation of civilian industries will increase as a result of the growth of the defense industries. In addition, we expect advances in missile production and nonconventional weapons will maintain Iraq's military superiority over Iran and will narrow slightly the technological gap with Israel.

Despite these gains, progress is unlikely to keep up with some of the regime's more grandiose expectations, and some Iraqi weapons programs probably will fail or be abandoned. Many of the systems displayed by Iraq at its arms fairs probably can be procured more cheaply abroad, and the benefits of domestic production probably will not outweigh the costs for some weapons, which Baghdad will continue to import. Moreover, as a result of high local production costs and financial problems, Iraq probably will continue to emphasize certain high-priority areas, such as missiles and artillery, while progressing more slowly in others, particularly armored vehicles and aircraft. We believe the improvements in manufacturing steel and weapons components are helping Iraq build a modern industrial base that will allow continued development well into the next century.

Iraq's economy probably will benefit from Baghdad's plans to convert excess capacity in the defense industries to civilian use. In addition, the demand of the defense industries for locally produced goods probably will spur production and economic growth as well as create a larger pool of skilled labor. Continued improvements in management and production techniques will reduce waste and free additional resources to help fund growth in the defense industries and the civilian economy. In our judgment, financial problems alone will not persuade Baghdad to abandon or slow its programs. The regime almost certainly will continue to believe that long-term economic benefits from its industrialization effort more than compensate for current sacrifices.

Greater defense production almost certainly will allow Iraq to increase its exports of conventional arms. We believe Iraq is positioning itself to become a significant

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### *Iraqi Arms Exports: Arsenal for the Arab World?*

During the Baghdad arms exhibition in 1989, Huseyn Kamil announced that Iraq was ready to sell weapons to friendly nations. Baghdad apparently has established potential arms relationships with several Arab states and is beginning to barter or sell some indigenous products in Europe.

Significant exports are several years off, in our judgment. Iraq probably does not produce a sufficient amount of major weapons, although other categories of military supply are increasingly available. For example, Iraq has offered hundreds of thousands of protective masks and small arms munitions and thousands of bombs and rifles for sale to defense firms in the Middle East, Asia, and Europe. Moreover, Iraq has sold indigenously produced military supplies to Egypt. Other Middle Eastern countries have expressed interest in Iraqi light arms and production technology.

Iraq may hope its exports will bring in needed foreign exchange, but Baghdad has resorted to countertrade arrangements to make sales. For example, Iraqi munition factories have supplied explosive materials to organizations in several European countries as payment for goods received. Iraq has tried to trade chemical protective masks, filters, and clothing to Bulgaria for a combination of raw materials and hard currency. The Iraqis were willing to accept 100-percent barter if large amounts of Iraqi equipment were ordered.

Baghdad probably does not expect exports to fund its defense industries, but we believe the Iraqis will try to increase exports as production capabilities improve.

Iraq's high production costs will continue until it increases the number of trained managers and skilled laborers. Iraq's arms are likely to be less competitive in the world market for many years.

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regional exporter, although the Iraqis probably do not intend to rely on sales to offset much of the costs of their arms industries. For example, we believe Iraq's licensing agreements with Brazil and Yugoslavia allow for export sales. Neither country showed competitive systems at the Baghdad arms fair in April 1989. Prestige and the attendant political benefits from sales will be Baghdad's most important gains.

Iraqi dependence on foreign suppliers will continue to be substantial because the gap between local production and international state-of-the-art weapon systems will remain wide, in our judgment. Key elements of Iraq's inventory, particularly aircraft, will continue to be procured from foreign suppliers. The Ministry of Industry and Military Industries is not likely to attain self-sufficiency in state-of-the-art design for most weapon components, and it will continue to depend on foreign designs for advanced weapon systems.

Iraq will be less vulnerable to arms embargoes by the mid-1990s. Although trailing the West technologically, we believe Iraq will be able to produce weapon systems, such as artillery, multiple rocket launchers, small arms, and munitions, sufficient for its needs against regional enemies. Moreover, the increased production capacity of its ammunition factories will give it a greater capability to conduct prolonged fighting without foreign resupply.

#### Implications for the United States

Iraq's military industrialization program presents a significant problem for controlling US-origin goods and technology and preventing its use in Iraqi military programs, particularly strategic projects developing missiles and nonconventional weapons. Because of the linkage between Iraq's civilian and military industries and strict control of access to military facilities, dual-use equipment and technologies can be diverted easily from civilian to strategic military programs. Moreover, Iraq almost certainly will continue its clandestine efforts to procure US-origin equipment and technology. It undoubtedly will take steps to improve its covert procurement in the aftermath of the

US-British sting operation in late March 1990 that intercepted the export to Iraq of US-origin nuclear weapons triggering components.

Baghdad probably will measure its relations with Washington at least in part by its access to US technology with dual-use capabilities. Although Iraq has often expressed its preference for US technology, it has shown a determination to forgo US equipment—or use clandestine acquisition methods—rather than submit to stringent controls. Baghdad resents US efforts to get other countries—particularly in Western Europe—to restrict transfer of equipment and technology to Iraq through agreements like the Missile Technology Control Regime.

Saddam probably perceives US criticism of Iraq's strategic and nonconventional weapon programs as an effort to undermine his regime, and he is likely to rebuff US pressure to end Iraqi efforts to acquire Western technology for strategic industries. Baghdad believes these weapons provide a deterrent against its enemies and—along with the defense industries that produce them and other systems—are essential to Iraqi national security. We believe Baghdad will continue to contrast US cooperation with Israel on various weapon programs, such as the Arrow missile, with restrictions placed on exports to Iraq as it argues for greater access.

Baghdad probably will continue to react strongly—as it did to the US-British sting operation—to explicit US efforts to punish Iraq. Despite its heated public rhetoric, Baghdad almost certainly would prefer to minimize damage to commercial relations because the United States is a major civilian supplier and important market for Iraqi oil. Iraq, however, would probably discontinue servicing some of its \$2 billion debt to the United States if Washington applies sanctions or cancels the agricultural credit guarantee program in response to continued Iraqi export violations.