

Addendums to the Comprehensive Report

of the Special Advisor to the DCI on
Iraq's WMD

March 2005

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**Prewar Movement of WMD
Material Out of Iraq**

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Prewar Movement of WMD Material Out of Iraq

ISG formed a working group to investigate the possibility of the evacuation of WMD-related material from Iraq prior to the 2003 war. This group spent several months examining documents, interviewing former Iraqi officials, examining previous intelligence reports, and conducting some site investigations. The declining security situation limited and finally halted this investigation. The results remain inconclusive, but further investigation may be undertaken when circumstances on the ground improve.

The investigation centered on the possibility that WMD materials were moved to Syria. As is obvious from other sections of the *Comprehensive Report*, Syria was involved in transactions and shipments of military and other material to Iraq in contravention of the UN sanctions. This indicated a flexibility with respect to international law and a strong willingness to work with Iraq—at least when there was considerable profit for those involved. Whether Syria received military items from Iraq for safekeeping or other reasons has yet to be determined. There was evidence of a discussion of possible WMD collaboration initiated by a Syrian security officer, and ISG received information about movement of material out of Iraq, including the possibility that WMD was involved. In the judgment of the working group, these reports were sufficiently credible to merit further investigation.

ISG was unable to complete its investigation and is unable to rule out the possibility that WMD was evacuated to Syria before the war. It should be noted that no information from debriefing of Iraqis in custody supports this possibility. ISG found no senior policy, program, or intelligence officials who admitted any direct knowledge of such movement of WMD. Indeed, they uniformly denied any knowledge of residual WMD that could have been secreted to Syria.

Nevertheless, given the insular and compartmented nature of the Regime, ISG analysts believed there was enough evidence to merit further investigation. It is worth noting that even if ISG had been able to fully examine all the leads it possessed, it is unlikely that conclusive information would have been found. At best, barring discovery of original documentary evidence of the transfer, reports or sources may have been substantiated or negated, but firm conclusions on actual WMD movements may not be possible.

Based on the evidence available at present, ISG judged that it was unlikely that an official transfer of WMD material from Iraq to Syria took place. However, ISG was unable to rule out unofficial movement of limited WMD-related materials.

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**Iraqi Detainees: Value to Investigation of
Iraq WMD and Current Status**

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Iraqi Detainees: Value to Investigation of Iraq WMD and Current Status

The Comprehensive Report of the Special Advisor to the DCI on Iraq WMD relied upon multiple sources for the collection of information regarding Iraq's weapons of mass destruction (WMD) program. The *Comprehensive Report* made extensive use of the information provided by numerous detainees, including Saddam Husayn. The unprecedented access to this type of regime information provided a unique perspective on the intentions, policies, programs, and mechanisms of the former Regime's WMD programs and international policy.

Unique Access to Key Individuals

Immediate access to the detainees allowed ISG to interview knowledgeable Iraqis on a broad range of issues. ISG analysts were able to compare the accounts of multiple high-ranking or well-placed detainees with information from captured documents and other (nondetained) Iraqis. These multiple sources provided rich detail and allowed ISG to gauge the consistency and reliability of the information provided.

These interviews provide an in-depth understanding of the former regime's strategic intent, its military industrial complex and its security organizations. They also provided ISG with comprehension of Iraq's WMD programs, including management, funding, and use as seen from within the regime. For example, detainee debriefs allowed ISG to confirm the use of the chemical agent VX during the Iran-Iraq war and the use of nerve agent in Karbala during the Shia uprising following the 1991 war.

The opening chapter of the report, "Regime Strategic Intent," particularly benefited from access to the detainees who embodied the top leadership of the Regime—including Saddam. Much of the chapter is based upon information from detainee interviews. The depth of knowledge on the regime's structure, operations, programs, and functional WMD infrastructure would not have been nearly as detailed or credible without this direct access.

Nevertheless, it is essential to bear in mind that these interviews were custodial interviews and statements made by detainees would have been affected by these conditions. Moreover, once detainees are freed or face trial they may make statements at variance with what they told the ISG.

Identification and Detention

The "blacklist" of individuals targeted for arrest and detention was drawn up prior to the 2003 war, and it was shaped by various organizations with a range of considerations and objectives.

CENTCOM and intelligence agencies initially engaged in compiling lists based on their own criteria and for their own purposes. WMD as a criterion existed because of the projected existence of WMD and concern that such materials be located quickly for force protection reasons in the first instance and other nonproliferation concerns secondly. Individuals were also included on the list if they were judged central to maintaining the regime in power, able to influence events on the battlefield, or had responsibility for the regime's past actions.

While the top 55 names on the list were well publicized (due in part to their circulation as faces on decks of cards), the blacklist contained over 300 names and the full list was not publicly known. This created sizeable uncertainty among Iraqis concerning whether they were wanted or not. Moreover, in the period following the war, many Iraqis, whether listed or not, were captured and detained for a wide range of causes. It was also announced after the war that WMD participants could be subject to arrest and prosecution. These factors combined to cause Iraqi WMD participants at virtually all levels to attempt to remain undetected by coalition forces. Many were successful, but almost all the top WMD personalities were either captured or turned themselves in—many with the expectation that their detention would be short.

Prewar intelligence was the basis for constructing the blacklist and hence it was subject to some of the same inaccuracies and also, by the nature of constructing a list, was the product of a certain amount of capriciousness. Some very despicable individuals who should have been listed were not, while many technocrats and even opponents of the Saddam regime made the list and hence found themselves either in jail or on the run. Up to the publication of this report 105 of the blacklists were detained. Some of the WMD figures and other detainees were assessed to have been erroneously detained and were released in the first few months after the war.

Debriefing

The Iraqis of interest to ISG were mostly senior level scientists, engineers, or program managers known from UN inspection activities. Other detainees of relevance to the WMD investigation were senior military, security, or regime leaders. Many individuals who were key to, or very knowledgeable about, WMD programs were not listed and thus not detained but some were located and submitted voluntarily to debriefing. All these individuals proved to be valuable sources of information.

In general terms, technocrats tended to be quite cooperative with the ISG. Those who may have perceived a risk of prosecution for one reason or another may have been less forthcoming. In some cases ISG subject matter experts (SMEs), often former UN inspectors, had been dealing with these individuals for many years. This provided an unusually strong base from which to debrief in detail. Moreover, the detainees were more inclined to be forthcoming with counterparts for whom they had a level of respect. Several detainees made a considerable effort to help facilitate understanding of the former regime and the WMD programs.

The debriefing process was not without difficulties. Control of the detainees and the ultimate responsibility for debriefing belonged to the military. Standard military procedures are designed more to collect intelligence of tactical importance with an immediate goal of collecting information either for force protection

purposes or to guide offensive military actions. The standard doctrine for debriefing detainees was thus not well suited to the accumulation of understanding of previous activities of the regime. The standard process requires the creation of a source directed requirement (SDR) from a SME (usually not located in theater) to a collector in the field, which proved to be a cumbersome approach. While in Iraq the debriefers (collectors) and SMEs were often collocated and could talk face-to-face on a daily basis, the process quickly abbreviated and SMEs generally participated directly in debriefings. This modification of procedure for the purposes of developing understanding of Iraq's WMD programs was essential. It should be emphasized that these debriefings were not hostile.

It should be noted that the DCI's Special Advisor met with many of the senior detainees directly. He had known them quite well from his previous position as Deputy Chairman of UNSCOM during the 1990s. There was significant candor on the part of these former ministers during these discussions.

An area of difficulty emerged in recording the information. The accepted method of creating a permanent record was by writing Intelligence Information Reports (IIRs). However, IIRs were not written in a timely fashion, sources were not specifically identified and the reports tended to be short, address a specific topic and thus do not provide context. Connective tissue does not exist among these reports. An example of absent contextual information is seen in an IIR developed from a debrief describing one detainee's favorable remarks about a second detainee. However, the fact that these two detainees were married was never reflected in the report.

Another shortcoming concerning dependence upon IIRs as a method of record is that the information in some reports was later either confirmed or proven incorrect, but earlier incorrect IIRs remain part of the record. Thus, incorrect information was recorded in the form of an IIR, classified, and never amended to reveal a more accurate update.

The constant rotation of ISG personnel had negative consequences. Many detainees had as many as four different debriefers and were debriefed dozens of times, often by new, inexperienced, and uninformed

debriefers. This was also the case with the SMEs who also rotated regularly. These individuals usually had even shorter terms in Baghdad—sometimes only a month or two. Not knowing the details of previous debriefs, new debriefers and SMEs often asked detainees to retrace ground already covered. This had two unfortunate results. First, the detainees became quite familiar with the type of information we wanted and as a result, developed a “party line” (e.g., blaming everything on Husayn Kamil or Qusay Husayn). Second, they failed to develop, or lost, respect for the debriefers.

Shortcomings in the management of staffing ISG contributed to debriefing difficulties as well because of deployment of many debriefers and SMEs who were inexperienced and lacking in knowledge and expertise on Iraq. Short tours exacerbated this problem, as individuals often left just as they were gaining expertise and knowledge useful to the ISG investigation.

A consequence of the way detainees were incarcerated also affected the debriefing results. High-level detainees were all kept at Camp Cropper and were allowed contact with one another. Some detainees assumed the rank and presence of their status in the former regime. One made it a habit to debrief the detainees following their sessions. This may have allowed for some rigging of stories and intimidation.

Finally, there were some discrepancies between the techniques of the debriefers and the mission of the ISG analysts, who for the most part were civilian

intelligence officers or scientists. For example, if the detainee’s discussion wandered into topics of strategic or political nature, many debriefers would cut the digression short and redirect the detainee back to the more specific tactical focus of the written SDR, potentially losing significant information about the nature and operations of the regime. In addition, some of the information of political value was not published in an IIR if it was not requested in an SDR.

While results obtained when debriefing individuals in custody may differ from those received when they are speaking on their own volition, we believe detainees still provided a vital primary source of information on Iraq’s WMD programs and regime strategic intent. The result was the emergence of a fairly detailed picture that was tested against data from other individuals, physical evidence gained from site exploitation and captured documentation.

Conclusion of the WMD Debriefing

As matters now stand, the WMD investigation has gone as far as feasible. After more than 18 months, the WMD investigation and debriefing of the WMD-related detainees has been exhausted. As far as the WMD investigation is concerned, there is no further purpose in holding many of these detainees. These individuals have shown no reluctance to engage in further discussions should the need for questioning about past WMD programs emerge.

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**Residual Proliferation
Risks: People**

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Residual Proliferation Risks: People

Saddam's WMD programs created a pool of scientific experts, experienced in the disciplines necessary to research, develop and produce these weapons. Although the infrastructures built to support the WMD program created employment for many thousands, the core of experts with unique WMD-associated skills was a subset. For example, while many engineers and technicians worked on the nuclear program, the designers of critical components were less numerous.

The enforced hiatus in research, development and production of WMD, post 1991, probably deteriorated their skills, and many found alternative employment. Nevertheless some Iraqis with knowledge of proliferation concern remain.

Such individuals may not be attractive to countries of concern because of a possible reluctance to rely on foreigners of questionable loyalty or reliability. However, there is also some risk such expertise may attract the attention of terrorists or insurgents who desire any WMD capability.

Key Judgments

The precise population of participants in Iraq's WMD programs is impossible to quantify. A senior Iraqi official associated with the pre-1991 program stated that the numbers of WMD-associated scientists reported in Iraq's declarations to the UN were grossly inflated to confuse inspectors. He also stated that there probably were no more than approximately 1,100 scientists and possibly as few as 600 with core expertise specific to WMD research, development and production requirements. However none of these figures can be verified.

In the 12 years under sanctions since the end of the first Gulf war, many members of Iraq's scientific and technical communities have increasingly struggled to find any job let alone employment that would preserve WMD skills. Because skills specific to WMD

development undergo a natural decay, it is likely that the subset of former regime scientists who still possess potentially dangerous expertise is shrinking.

So far there is very little evidence that either foreign jihadists operating in Iraq or Iraqi insurgent groups are attracting experts from the former regime's WMD programs.

Introduction

This section looks at the potential proliferation risk of Iraq's former WMD-associated personnel working for countries of concern, terrorists, or insurgent groups. It characterizes the scale of the problem, examines motivations that may influence personal decisions made by members of this community, and describes the options we believe they currently face.

Scoping the problem

While the number of individuals involved in the Iraq WMD programs throughout the past thirty years is in the thousands, there is a fairly small subset who may remain of concern today. Precision is impossible, but it is worth noting that one or two individuals with the right skills could make a significant impact in a WMD effort.

UN sanctions and intrusive UNSCOM inspections dampened the Regime's ability to retain its WMD expertise. During the course of the 1990s, staffs were directed to civilian enterprises. Concomitantly, attrition through emigration, retirement and natural processes occurred.

- UN inspectors identified approximately 3,500 former WMD-associated individuals in Iraq prior to OIF based on Iraqi declarations of WMD-associated personnel. However, according to an NMD official interviewed after the war, this list included many non-WMD personnel to confuse the inspectors.

- By way of reference, in 2002, the Intelligence Community identified approximately 1,000 personnel believed associated with the Regime's WMD-related activities.

The Regime made efforts through the 1990s and up to 2003 to maintain the expertise of former WMD scientists and engineers. Saddam instituted the law of scientific patronage in the early 1990s as a legal mechanism to minimize the risk of losing his scientific community and to maintain their skills. The law enabled Iraqi scientists to augment their meager salaries through government payments. At the same time he also encouraged scientists to form close fraternities (as in the case of the nuclear scientists).

- The law for the patronage of scientists provided cash grants twice yearly up to OIF to a list of key scientists under the guise of academic grant schemes.
- An Iraqi document recovered by ISG identified 136 scientists from many scientific disciplines as "would be" beneficiaries of the law of scientific patronage. ISG identified 48 of the 136 scientists that reporting indicates were involved in Iraq's pre-1991 WMD programs.

Current Environment: Limited Employment Opportunities

Unemployed WMD experts may have economic reasons to seek markets for their talents, and if civilian occupations are unavailable, they may seek to work in WMD capacities. For some, there may also be a political motivation as a consequence of the removal of Sunni Ba'athist power, Coalition and IIG policies, and the current security environment in Iraq. As a result of the ongoing shift in the Iraqi social order, many have lost their positions, both within society and in their places of employment.

Academic Institutions

Currently, Iraq's university system may have the potential to absorb some of the WMD-associated community; however, de-Ba'athification policies and the rise of violence at Iraqi universities since OIF deter their employment. Before OIF, Iraq had an extensive university system, with at least one university in every province. Key national universities, such as University of Baghdad and Saddam University, provided employment in the 1990s to personnel previously associated with Iraq's WMD programs. Under Saddam, WMD scientific personnel were shuffled in and out of universities in an attempt to maintain their core skills and ensure their employment. A reliable senior former National Monitoring Directorate (NMD) official now working for the Iraqi Government supported the following claims made in Iraqi newspapers:

- Today, universities are not Baathist friendly and often display violence against the perceived wealthy (for example, ex-WMD-associated scientists).
- The largely secular WMD experts may be uncomfortable with the emerging religious direction of Iraqi academic life.

Interim Iraq Government

Interim Iraqi Government institutions, such as NMD and the Ministry of Higher Education employ some of the former WMD experts. We believe the numbers are small and at NMD, according to an NMD official interviewed after the war, former WMD experts are relegated to lesser positions because of de-Ba'athification policies.

Risk of Migration to Countries of Concern

Migration of some WMD-associated program personnel to countries like Iran or Syria is possible. Previous contact, financial inducements, academic or professional opportunities and possibly the prospect of frustrating coalition countries, may be motivators.

Although the potential recruitment of WMD scientists by hostile states is an obvious threat, there is only very limited reporting suggesting that this is actually taking place and no reports that indicate scientists were recruited to work in a WMD program.

- Unidentified members of the Supreme Council for Islamic Revolution in Iraq (SCIRI) allegedly smuggled an Iraqi rocket scientist into Iran at the request of Iran's Ministry of Intelligence and Security.

Recruitment by Terrorists or Insurgents

Since OIF, the ISG is aware of only one scientist associated with Iraq's pre-1991 WMD program assisting terrorists or insurgents. However, there are multiple reports of Iraqis with general chemical or biological expertise helping insurgents to produce chemical and biological agents.

- An Iraqi scientist (no known affiliation with the former regime's WMD program) was involved with the production of chemical mortar munitions.
- Iraqi entities (no known affiliation with the former regime's WMD program) aligned with Sunni extremists established chemical laboratories for the fabrication of chemical weapons at various locations in and around Baghdad (the Al Abud network).

Emigration From Iraq

There are many reports of Iraqi professionals who have left Iraq because of the lack of security, rampant crime and kidnapping in Iraqi cities, especially Baghdad. Kidnapping for ransom and death threats allegedly have forced doctors, scientists and many from the wealthier sector of the population to migrate to safer countries. However, professionals leaving Iraq probably have also done so for a variety of benign reasons.

- Reporting indicates that unidentified groups conducted both kidnapping and assassination of Iraqi professionals and have threatened violence, some of which was carried out, against the scientific and medical communities to pressure these individuals to leave the country.
- An Iraq gang, aided by Iraqi police, reportedly has kidnapped wealthy Iraqis for ransom. The money generated allegedly funds anti-coalition attacks.
- One prominent Iraqi doctor allegedly paid a \$30,000 ransom and was forced to leave Iraq on threat of death. A prominent nephrologist allegedly paid a \$1 million ransom with the prospect of a similar fate if he stayed in country.
- By March 2004, according to press reports, insurgents assassinated more than 1,000 Iraqi professionals and intellectuals, including Muhammad al-Rawi, the President of Baghdad University. Whether such reports are accurate or not they reflect a widespread concern among the technical elite.
- Many (especially older) scientists and engineers have links with Europe and the United States; many have language and cultural familiarity with the West so that their integration into those professional networks should still be sufficiently robust enough to help them find work in the West.
- Many of the western academic institutions are competitive in the way they attract lecturers and most would probably be open to accepting members of the Iraqi scientific community.
- Marriage and family links to the West give a number of former WMD scientists and engineer's dual citizenship or permanent residence in the West.
- Many members of the scientific population would probably prefer to migrate to the West, although this is not necessarily indicative of their political allegiances.

Some former WMD participants had academic and professional links to countries within the former Soviet Union. However, former Soviet countries have little to gain from Iraqi WMD expertise. The emigration of scientists to other Arab states, where the civil and commercial infrastructures could benefit from their expertise, has been occurring for years and will continue.

Conclusion

“Brain drain” is an ongoing phenomenon in Iraq today. Former WMD scientists led privileged lives before Iraq’s invasion of Kuwait. For over ten years they have endured, much like the rest of the Iraqi

population, a steady decline in their living conditions. Post-OIF Iraq for them is worse still. However, despite the obvious risk factors, former WMD program participants are most likely to seek employment in the benign civil sector, either in Iraq or elsewhere. While the danger remains that hostile foreign governments, terrorists or insurgents may seek Iraqi expertise, the subset of individuals who possess the unique WMD skills of proliferation concern is numerically small. However, because a single individual can advance certain WMD activities, it remains an important concern.

**Residual Pre-1991
CBW Stocks in Iraq**

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Residual Pre-1991 CBW Stocks in Iraq

ISG assesses that Iraq and Coalition Forces will continue to discover small numbers of degraded chemical weapons, which the former Regime mislaid or improperly destroyed prior to 1991. ISG believes the bulk of these weapons were likely abandoned, forgotten and lost during the Iran-Iraq war because tens of thousands of CW munitions were forward deployed along frequently and rapidly shifting battlefronts.

- All but two of the chemical weapons discovered since OIF were found in southern Iraq where the majority of CW munitions were used against Iran in the Iran-Iraq war.
- As the Coalition destroys the thousands of conventional munitions at depots around the country the possibility exists that pre-1991 vintage chemical rounds could be found mixed in with conventional munitions at these locations.

—ISG identified 43 bunkers and depots where the Coalition is in the process of destroying conventional munitions and that were suspected of being associated with the pre-1991 WMD programs.

However, ISG believes that any remaining chemical munitions in Iraq do not pose a militarily significant threat to Coalition Forces because the agent and munitions are degraded and there are not enough extant weapons to cause mass casualties. However, if placed in the hands of insurgents, the use of a single even ineffectual chemical weapon would likely cause more terror than deadlier conventional explosives.

- Since May 2004, ISG has recovered 41 Sakr-18 CW rockets and eight Buraq CW rockets. Coalition military explosive experts doubted the rockets could be effectively launched because the physical state of the munitions was degraded from years of improper storage.
- Since 2003, insurgents have attacked Coalition Forces with two CW rounds (not including attacks with riot control agents) that ISG judges were produced by Iraq prior to 1991. Neither attack caused



Sakr 18 Rockets



Buraq warheads

casualties and ISG believes the perpetrators did not know the rounds contained CW agent because the rounds were not marked to indicate they contained CW agent and they were used no differently than insurgents had employed conventional munition Improvised Explosive Devices (IEDs).

- The mustard round used by insurgents as an IED near Abu Ghurayb Barracks on 2 May 2004 contained agent degraded to such an extent to be ineffective.



Sarin IED

- There continues to be reporting that indicates terrorists and insurgents possess chemical or biological weapons, although there is no evidence indicating that they have obtained “functional” CBW weapons or agents from the former Regime’s programs. An insurgent captured in Fallujah stated, “If we had chemical weapons, we would have used them.”

Iraqis seeking rewards have added toxic chemicals to unfilled pre-1991 chemical munitions to fool Coalition Forces into believing that they had found CW munitions.

- Polish Forces recovered 41 Sakr-18 rockets in June and July 2004. Of the rockets tested one contained residual sarin, five contained petroleum and a pesticide, and the remainders were empty. ISG believes that the Iraqis who provided the rockets added the pesticide because we have no previous reporting indicating that Iraq weaponized pesticides.



Mustard IED

ISG has not found evidence to indicate that Iraq did not destroy its BW weapons or bulk agents. However, even if biological agents from the former program do remain they probably have significantly decreased pathogenicity because Iraq never successfully formulated its biological agents for long-term storage.

- According to a former Iraqi BW researcher, Iraq was not able to acquire drying technology because of sanctions.

**Residual Proliferation Risk:
Equipment and Materials**

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Residual Proliferation Risk: Equipment and Materials

In autumn 2004, ISG systematically reviewed available information on facilities suspected to be associated with Iraq's chemical, biological, or nuclear programs to develop a snapshot of the remaining infrastructure in Iraq and its potential for diversion to WMD use—either by Iraq or others. The mission to look for dual-use or residual capabilities was started late in the ISG process and the declining security situation halted our site visits; therefore, the judgments in this paper reflect only a small and incomplete sampling of Iraq's infrastructure.

Chemical and Biological Facilities

ISG judges that Iraq's remaining chemical and biological physical infrastructure does not pose a proliferation concern. The effects of sanctions, war, and looting have destroyed, displaced, or severely degraded much of Iraq's dual-use equipment. However, the missing equipment could contribute to insurgent or terrorist production of chemical or biological agents.

- Muthanna and Fallujah chemical production facilities—sites formerly associated with Iraq's CW Program—were completely razed and looted. Many buildings were removed piece by piece.
- ISG found no stockpiles of precursor chemicals necessary for synthesis of militarily significant quantities of agent.
- Officials from NMD stated that souks (market areas) are selling small- and large-scale (pilot plant size) laboratory equipment. The officials suspect that the equipment was looted from Iraqi industrial facilities.

Nuclear-Related Facilities

ISG judges that Iraq's current industrial and technical infrastructure, with its dual-use equipment and materials, probably does not pose a nuclear proliferation concern as long as the Iraqi Government maintains control over the equipment and materials—a difficult task for the new government. This judgment also includes an assumption that Iraq will not restart its WMD programs.

- From September to November 2004, ISG surveyed 16 of 45 sites that reporting indicated had potential nuclear-related dual-use equipment and/or materials prior to OIF. ISG found about two-thirds destroyed or nonoperational and the remaining sites secured and operating. (See table 1.)
- ISG found potential nuclear-related dual-use equipment at 10 of the 16 sites visited. However, only six sites had equipment that appeared operable and all sites were fenced or walled and protected by the Iraqi Facility Protection Service (FPS). ISG identified machines as potentially dual-use based on IAEA's general description of dual-use machine categories, such as multi-axis CNC milling machines.¹ (U)
- ISG observed IAEA- or UNSCOM-tagged equipment at seven of the 16 sites, five of which were at least partially operating and protected by the Iraqi Facility Protection Service.

¹ A true determination of dual-use status requires an understanding of an individual machine's capabilities and specifications, such as camming and runout tolerances, positioning (rotary and linear) accuracies, and axes coordination, as well as its software capabilities, such as the capability to control multiple axes simultaneously for "contouring" and flexibility to provide "real-time processing" by means of multiple detection techniques. Due to the limited nature of the survey, the ISG did not determine the actual dual-use status of potential dual-use equipment; such a determination requires a detailed investigation into the actual capabilities and specifications of individual machines, a task beyond the nature of the survey.

Table 1. Findings for Sites Surveyed in September to November 2004 Time Frame	
Facility	Facility Status
17 Nissan State Company	Heavily damaged and looted; nonoperating; remnants of some machinery/equipment found; deserted and no security
Al Zawra State Company	Intact; operating; armed Facility Protection Service guards
Al Hamath	Intact; nonoperating; no machinery/equipment; deserted except for armed security
Al Salaam State Company	Heavily damaged and looted; nonoperating; remnants of 2 presses found; deserted except for unarmed security
Ash Shaykhili Warehouses	Heavily damaged and looted; nonoperating; no machinery/equipment; occupied by squatters and no security
Ibn Yunis Center	Structurally intact and occupied by US forces; nonoperating; no machinery/equipment
Specialized Institute for Engineering Industries (SIEI)	Intact; operating; armed Facility Protection Service guards
Al Nasr State Company	Intact; operating; armed Facility Protection Service guards
Rashid State Company's Dhu al-Fiqar Factory	Intact; operating; armed Facility Protection Service guards
Al Nasr Al 'Azim State Company (formerly State Establishment for Heavy Equipment Engineering (SEHEE))	Intact; operating; armed Facility Protection Service guards
Al Raya State Company	Totally destroyed and razed; nonoperating; remnants of some machinery/equipment found; deserted except for South Taji Industrial Complex armed security
Al Zahf Al Kabir State Company	Intact with minor looting/vandalism; nonoperating; some machinery/equipment found; deserted except for possible local security guard and South Taji Industrial Complex armed security
Tarmiya Technical School	Heavily damaged and looted; nonoperating; no machinery/equipment; deserted and no security
Tuwaita Nuclear Research Center	Damaged and looted; partially operating; neutron generator found; armed Facility Protection Service guards
Baghdad (Tuwaita) Nuclear Research Center Tools Workshop	Heavily damaged and looted; remnants of some machinery/equipment found; deserted except for armed Facility Protection Service guards in the vicinity
Al Qa'qa'a State Company Explosives Bunkers	All surveyed bunkers empty or destroyed

- An Iraqi court recently acquitted an Iraqi official who allegedly negotiated, but did not complete, the sale of machine tools from the Al Karama Company to Iran. The Iraqi Government has successfully appealed the decision in a higher court. The higher court has sent the case back to the lower court, where a new judge will retry the case.

Only in a few instances did ISG site surveys look for nuclear-related dual-use materials. The Al Qa'qa'a missile propellant and high explosives production facility was surveyed for the presence of dual-use explosives, while the Rashid State Company's Dhu al-Fiqar Factory was investigated to verify the presence of high-strength aluminum tubes. The ISG did

Table 2. UNSCOM- or IAEA-Tagged or Monitored Equipment Identified by ISG		
Facility	Machine Type	IAEA/UNSCOM
Specialized Institute for Engineering Industries (SIEI)	C.E. Johansson CMM ^e	IAEA Tag # 157128
Al Nasr State Company	DEA CU/01 CMM ^a	IAEA Tag # 148953
	Hauser S50L Milling Machine ^a	IAEA Tag # 149419
	Bridgeport Milling Machine ^a	IAEA Tag # 157045
	DEA QCM1 CMM ^a	IAEA Tag # 146789
Rashid State Company's Dhu al-Fiqar Factory	Rexroth Flow Forming Machine ^b	IAEA Tag # 3344290
	H&H Flow Forming Machine ^b	UNSCOM Tag # ME05045
	Flow Forming Machine ^b	UNSCOM Tag # ME05170
Al Raya State Company	Arcardini CMM ^e	IAEA Camera Monitored
Al Zahf Al Kabir State Company	Glovebox ^c	UNSCOM Tag # B002486
	Glovebox ^c	UNSCOM Tag # B002487
	Unidentified Item ^d	UNSCOM Tag# B002488
	Unidentified Item ^d	UNSCOM Tag# B002489
Al Nasr Al 'Azim State Company (formerly State Establishment for Heavy Equipment Engineering (SEHEE))	Boldrini 2500/4500 Dual Column Press ^a	IAEA Camera Monitored
Tuwaittha Nuclear Research Center	Neutron Generator ^f	
^a Operational ^b Dismantled ^c Repairable ^d Condition unknown ^e Inoperable ^f Partially dismantled, and needs reconditioning		

not specifically look for maraging steel but officials at the secured and operational sites said that none was present at these facilities.

- In October 2004, ISG surveyed all 56 bunkers in the southern complex at Al QaQa'a, which include the 10 bunkers previously sealed and monitored by the IAEA. ISG found the facility unoccupied and the explosives storage bunkers empty (see pictures).
- Approximately 70,000 high-strength aluminum 81-mm tubes are located in two padlocked warehouses (see pictures) at Dhu al-Fiqar Factory, which is within a secure facility protected by armed

Facility Protection Service personnel. According to a current NMD official, Dhu al-Fiqar Factory employees were cutting the tubes into pieces for use in the private sector.

Missing Equipment

ISG found that some potential nuclear-related dual-use equipment was missing from heavily damaged and looted sites, but ISG did not determine the ultimate disposition of the missing equipment. Some of it probably has been sold for its scrap value. Other



81-mm aluminum tubes in a Dhu al-Fiqr Factory warehouse.



81-mm aluminum tubes in a second Dhu al-Fiqr Factory warehouse.

pieces might have been disassembled for valuable subassemblies such as motors and condensers. Still others could have been taken intact to preserve their function.

- National Monitoring Directorate (NMD) officials stated that employees and facility management had removed some equipment at former suspect facilities in an effort to prevent equipment loss to looting or bombing. This technique was consistent with prior Iraqi war practices.
- An example of possible removal of equipment to preserve its function was seen at the Iraqi Atomic Energy Commission's Tuwaitha Tools Workshop. During the IAEC modernization Iraq purchased five new CNC machines (see main report). Two new Chen Ho multi-axis machines reportedly purchased for Tuwaitha and some older machines were not

found. The absence of any components of these machines may suggest they were removed in their entirety.

- The Ash Shaykili storage site located near the Tuwaitha Nuclear Research Center contained (prior to OIF) a variety of equipment and materials associated with Iraq's pre-1991 nuclear weapons program. While judged insufficient to reconstitute a nuclear weapons program, some of these items could be exploited to obtain information of potential use to a proliferant.



Intact, empty former HMX bunker at Al Qa'qa'a.



Destroyed former HMX bunker at Al Qa'qa'a.



Destroyed Al Qa'qa'a bunker that, according to IAEA, contained RDX/PETN prior to OIF.



Destroyed Al Raya State Company.



Al Raya State Company—damaged and looted Arcardini CMM camera-monitored by IAEA.



Destruction of Tuwaiitha Tools Workshop Site.



Tuwaiitha Tools Workshop—stripped Kao Fong Machine Tool.



Tuwaiitha Tools Workshop—stripped Chen Ho Machine Tools.



Annex 1 Nuclear-Related Dual-Use Equipment and Materials

Dual-use equipment and materials as defined by the International Atomic Energy Agency's (IAEA) *Transfers of Nuclear-Related Dual-Use Equipment, Material and Related Technology*, INFCIRC/254/Rev.5/Part 2 and Annex, are equipment or materials "that could make a major contribution to a 'nuclear explosive activity'".

Examples include:

- **Computer-Numerically-Controlled (CNC) Multi-Axis Machine Tools (turning, milling, grinding, or combination)**—capable of producing high precision parts, such as for enrichment centrifuges or even nuclear weapons parts.
- **Computer or Numerically Controlled Multi-Axis Coordinate or Dimensional Measuring Machines**—capable of providing quality control for high-precision parts, such as for enrichment centrifuges or even nuclear weapons parts.
- **Computer or Numerically Controlled Multi-Axis Spin-Forming or Flow-Forming Machines and precision Rotor Forming Mandrels**—capable of producing high-precision cylindrical rotors, such as for enrichment centrifuges.
- **Computer-Controlled Vacuum and Controlled Atmosphere Metallurgical Melting and Casting Furnaces**—capable of producing weapons parts.
- **Coordinated Multi-Axis Electrical Discharge Machines (EDM)**—capable of producing contoured high-precision parts, such as for enrichment centrifuges.
- **Special Software**—software specifically designed to support and enhance the capabilities of the above machines.
- **Maraging Steel**—special steel alloy for high-strength parts, such as enrichment centrifuges.
- **High-Strength Aluminum**—special aluminum for high-strength parts, such as enrichment centrifuges.
- **Specialty High Explosives**—high explosives, such as HMX, RDX, TATB, and HNS, HS, which may be useful to a nuclear weapons program.

Annex 2
Sites Suspected Prior to OIF to
Contain Potential Nuclear
Dual-Use Equipment and
Materials

The following sites were identified from reviews of intelligence as well as collaborative discussions with the Iraqi National Monitoring Directorate. These sites are related to the pre-1991 nuclear program and/or are sites suspected of possessing dual-use equipment.

ISG acknowledges that potentially sites are not listed here that a more comprehensive study would have identify.

ISG visited sites in bold during the September to November 2004 time frame.

1. **17 Nissan Factory**
2. Former Al Athir site belonging to Rashid State Company
3. Al Badr State Company
4. Milad State Company (Al Furat site)
5. Al Hadr high-explosive testing site
6. **Al Hamath, Tuwaitha**
7. Al Kindi State Company
8. Al Jazira plant site (Al Kindi State Company)
9. Al Karama State Company Waziriyah Plant
10. Al Nida State Company
11. Al Qa'qa'a State Company
12. **Al Qa'qa'a State Company Explosives Bunkers**
13. Al Qaim Superphosphate Fertilizer Plant
14. Al Radwan State Company
15. Al Rashid State Company
16. Al Rashidiya (site of the Al Faw State Company headquarters)
17. **Al Raya State Company**
18. Al Razi State Company
19. **Al Salaam State Company**
20. Al Samud State Company
21. Al Shahid State Company
22. Al Shuhada Mechanical Workshop, Saddam State Company
23. Al 'Ubur State Company
24. **Al Zahf Al Kabir State Company**
25. **Al Zawra' State Company**
26. Amin Factory, Rashid State Company
27. Amir Factory, Saddam State Company
28. Ash Sharqat (former EMIS enrichment site)
29. **Ash Shaykhili Warehouses, Tuwaitha**
30. **Tuwaitha Nuclear Research Center**
31. **Tuwaitha Nuclear Research Center Tools Workshop (IAEC Training Center, Tuwaitha Training Institute)**
32. **Dhu-al-Fiqar Factory Rashid State Company**
33. Factory for the Repair of Jet Engines (FRJE), Taji
34. Hittin State Company
35. Ibn al-Haitham Factory, Saddam State Company
36. Ibn-Firnas State Company
37. **Ibn-Yunis Center, Sa'd State Company**
38. **Al Nasr State Company**
39. Saddam State Company
40. Salah-al-Din State Company
41. **Specialized Institute for Engineering Industries (SIEI)**
42. **Al Nasr Al 'Azim State Company (formerly known as State Establishment for Heavy Equipment Engineering (SEHEE))**
43. Ibn Sina State Company, Tarmiya
44. **Tarmiya Technical School**
45. Umm-al-Ma'arik State Company

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**Iraq's Military Industrial
Capability—Evolution of the Military
Industrialization Commission**

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Iraq's Military Industrial Capability—Evolution of the Military Industrialization Commission

Introduction

Iraq's Military Industrialization Commission operated all of Iraq's military-industrial complexes, including industries and activities supporting the research, development, and production of chemical weapons and missile delivery systems. Iraq's nuclear and biological weapons programs were separate from the commission's institutional framework throughout most of its history, though like MIC, these programs reported to Husayn Kamil Hasan Al-Majid, Saddam's son-in-law. The creation and evolution of Iraq's military industrial capability, and Saddam Husayn's association with it, provides an important case study of how Saddam handled one of the Iraqi state's most valuable assets.

This paper will trace the history of military industry in Iraq with special emphasis on its structures and functions primarily through the eyes of three former senior officials: 'Amir Hamudi Hasan Al-Sa'di, 'Amir Muhammad Rashid Al-'Ubaydi, and 'Abd al-Tawab 'Abdallah Al-Mullah Huwaysh. Taken together, their relevant experience spans the entire period of Iraqi military industry after the Ba'thist Revolution. It is sectioned chronologically starting with Initial Steps (1930-1968) and FOLEX—SOTI (1968-1987), followed by The Husayn Kamil Era (1987-1995) and Transition (1995-1997) covering Kamil's mercurial management of military industry and then his defection. Finally, The Huwaysh Years (1997-2003) describes the operating environment of MIC during the tenure of 'Abd al-Tawab Abdallah Al-Mullah Huwaysh.

Following the main text are four annexes: Annex A outlines the influential people in the history of Iraq's military industrialization; Annex B expounds great detail on the growth of the military industrial complex and the entities it absorbed; Annex C provides insight to Saddam Husayn's role in Iraq's military-industrial projects; and Annex D is a reference for the various establishments, companies, and centers of the Military Industrialization Commission.

Editorial Note: This paper is based primarily on custodial interviews of Dr. 'Amir Hamudi Hasan Al-Sa'di, Dr. 'Amir Muhammad Rashid Al-'Ubaydi, and 'Abd al-Tawab 'Abdallah Al-Mullah Huwaysh; these interviews are supplemented by a handwritten document drafted in English by Dr. Al-Sa'di and a handwritten document drafted in Arabic by Huwaysh. As is often the case with participants of the former Regime, a certain degree of embellishment is presented by detainees to disassociate themselves from the Regime. Huwaysh had difficulty remembering exact dates and on some occasions provided a date that contradicted his previous statement. Alternate sources, both human and documentary, were used for corroboration whenever possible, yet some details of the account differ from Iraqi declarations.

History of Military Industry in Iraq

Initial Steps (1930s-1968)

In the years before the Ba'th Party came to power in 1968, the Iraqi Government took several steps to develop a domestic arms industry. In the 1930s under the monarchy, Iraq entered into an agreement with the British to gradually develop the capability to manufacture small arms, small-arms ammunitions, and artillery ammunition. Manufacture of small-arms ammunition for rifles (.303 Lee Enfield) and machine-guns (Bren and Vickers) began in the 1930s in the basement of the Ministry of Defense but World War II interrupted progress on the project. Several years after the war, Iraq moved production to a location known as Karantina while a modern new plant was built at Abu Ghurayb. The new plant, which later became Yarmuk State Company, contained new lines for .303 cartridge production with a single-shift capacity of 5 million rounds per year and for 9-mm Parabellum pistol and submachinegun cartridges with a capacity of 3 million rounds per year. The coup that overthrew the monarchy in 1958 delayed completion of the plant until the early 1960s.

Iraq and the British also built a facility at the Musayyib military camp for overhauling and reconditioning British-made small arms. The facility was equipped with machines to produce the various metal components for the Lee Enfield service rifle. Work on this facility was also interrupted by World War II and also delayed by the 1958 coup.

In 1939, Iraq signed a contract with the British to supply equipment for manufacturing artillery ammunition for the British-built guns in service with the Iraqi Army. As with the other plants, work was interrupted by World War II. The machines were delivered after the war and stored in a shed adjacent to the Musayyib small-arms facility. According to Dr. Amir al-Sa'di, these crates were opened once a year

for inspection and regreasing of the machines, but the plant was never built because Iraq changed from British to Soviet weapons after the 1958 coup.

After the overthrow of the monarchy in 1958, the Qassim government invited the USSR to conduct a survey and initial studies for the development of Iraq's civilian and military industrial capabilities. These were carried out in 1959 and 1960. Iraq then requested the establishment of four projects:

- The Waziriyah electrical equipment plant
- The Samarra pharmaceutical production plant
- The Ramadi glass production facility, and
- The Iskandariyah Mechanical Complex, which included two facilities:

—*Project #1 for the production of agricultural equipment*

—*Project #2 for heavy ammunition production*

Project design reports were made and submitted for approval in 1962 and 1963. The Iraqi Government was considering the voluminous project reports when the Ba'th Party and their allies ousted and killed Qassim in 1963. Although the Ba'thist faction was soon ousted, the new government continued to study the proposed projects. With credit facilities and very low prices for the supplies and technical assistance, Iraq had only to provide funds for the construction of the buildings, as well as lodging and local expenses for the Russian experts. All of the projects were approved, with the exception of the heavy ammunition plant, which was turned down on political grounds. All of the other projects were completed during the 1960s.

FOLEX—SOTI (1968-1987)

Iraq's program to develop its indigenous military-industrial capability gained momentum after the Ba'th party returned to power in 1968. In the years after 1968 but before 1972, the new Iraqi Government planned to convert the Musayyib refurbishment factory for the production of Russian-designed weapons—initially the SKS rifle and later the Kalashnikov AK-series weapons. Similarly, Iraq planned to convert the Abu Ghurayb ammunition plant to produce the 7.62 x 39-mm and 7.62 x 54-mm cartridges fired by the Russian weapons. With Egyptian technical assistance, the Musayyib plant was converted to produce the Egyptian version of the Russian Simonov SKS rifle. Egypt also assisted with the Abu Ghurayb plant conversion effort.

The Follow-up and Executive Committee

In 1972, Dr. 'Amir Hamudi Hasan Al-Sa'di formed and chaired a committee to plan, negotiate, and implement a program to develop self-sufficient Iraqi military industries, named the Military Industry Follow-up and Executive Committee (FOLEX). Taha Yasin Ramadan Al Jizrawi, who was both Minister of Industry at the time and a member of the Revolutionary Command Council (RCC), oversaw FOLEX throughout its existence. In addition to 'Amir Al-Sa'di, the committee included a munitions expert, a small-arms manufacturing expert, an engineer who had been the Director General of the Iskandariyah State Establishment for Agricultural Implements, and a civil engineer who previously headed the State Company for Construction. Taha Yasin Ramadan Al Jizrawi, then Minister of Industry and member of the RCC, supervised FOLEX and kept Saddam well informed about its activities. FOLEX committee members later became directors general of newly constructed facilities specializing in ammunition production of all types and calibers that became the heart of Iraqi military industry.

To accomplish this task, FOLEX revived and expanded Iskandariyah Project # 2, a mechanical complex for producing finished heavy ammunition, including production of metal components, explosive

Saddam's Role in Iraq's Weapons Programs

Saddam's interest in controlling Iraq's weapons programs dates back to his days as Vice President of Iraq. In the early 1970s, he became the head of the all-important "Committee for Planning and Follow-up of Development Projects." "Development Projects" in this context encompassed everything from agriculture to industry, infrastructure to health and education, as well as the armed forces. Each government organization drew-up five-year plans that required approval by the Committee. Saddam's investments in high technology, research and development, and indigenous weapons' production yielded results that varied widely in their success. Saddam wanted immediate results and did not have an appreciation of the long leadtime of most large industrial projects. As a general rule, Saddam's personal involvement in one project or another was not a strong predictor of its rapid progress or eventual success (for additional information, see Annex C: Saddam Husayn and Military Industrialization).

and propellant filling, integration, and test facilities. With the revival came expanded product lines and larger capacity than the original project that had been abandoned in the 1960s. FOLEX took over the artillery ammunition equipment purchased from the British and moved it to Iskandariyah, where the new plant had been constructed. With Russian technical assistance, the machines were incorporated into the Hittin complex for heavy ammunition production.

FOLEX also constructed a chemical complex for producing explosives, propellants, and pyrotechnic compositions from indigenous raw materials. The complex, later known as Al Qa'Qa'a, included test facilities and laboratories. FOLEX also constructed an industrial facility for producing specialized tools and dies for use in the ammunition and weapons factories, and training centers to prepare the local workforce to operate the factories without foreign assistance.

State Organization for Technical Industries

FOLEX became the State Organization for Technical Industries (SOTI) in April 1974. A Ba'ath party member and artillery officer, Maj. Gen. Sabbar Sirhan Al-Ani became the first president of SOTI, with 'Amir Al-Sa'di as vice president. In 1978 or 1979, Sabbar was suddenly pensioned off, leaving 'Amir Al-Sa'di as Acting President for about three weeks. Lt. Gen. 'Abd al-Jawad Majid Amin Lawand, an officer from the Electrical and Mechanical Corps, was appointed by Saddam to replace Sabbar. 'Abd al-Jawad led SOTI for the following five or six years. The SOTI President reported directly to Taha Yasin Ramadan who, in turn, reported directly to Saddam Husayn, at first when Saddam served as Vice President and Chairman of the Committee for Planning and Development, and later—after 1978—when Saddam served as President and Prime Minister. Just as with FOLEX, Ramadan also oversaw military industries as the *Mushrif* (Supervisor) of SOTI, with a direct line to Saddam. Ramadan became the Minister of Housing and Construction in 1976 and Deputy Prime Minister in 1979, but he remained Supervisor of SOTI until the mid-1980s, when Saddam appointed a new, more powerful board of directors for SOTI.

This new SOTI board of directors was appointed in February 1985 as the Iran-Iraq war dragged on and SOTI struggled to meet the ammunition and supply needs of the Iraqi military. Saddam designated Lt. Gen. Muhammad Jisam Hanash, the former commander of the Air Force, President of SOTI, with 'Amir Al-Sa'di, again, appointed as the Vice President of SOTI. Saddam recalled Al-Sa'di from the MLRS project in Yugoslavia in an effort to get production back on track. Muhammad Jisam served as President of SOTI until the arrival of Husayn Kamil Hasan Al-Majid, Saddam's son-in-law, in February 1987. Even before Kamil assumed a formal leadership role, however, he exerted powerful, although informal, influence on SOTI affairs beginning in 1985 or early 1986.

Taha Yasin Ramadan's supervision of SOTI ended at that time when Saddam placed his personal secretary, Hamid Yusif Hammadi, on the SOTI board of directors. In the early years, Taha Yasin Ramadan oversaw military industry for Saddam, but the presidential secretary's position on the board of directors created a direct link between the Presidential Office and SOTI,

'Amir Al-Sa'di's Sabbatical in Yugoslavia

'Amir Al-Sa'di left his job as Vice President of SOTI in November 1981, during the tenure of Lt. Gen. 'Abd al-Jawad, and moved to Belgrade as the head of a group of Iraqi engineers working to develop a multiple launch rocket system (MLRS). This project was a joint development program with Yugoslavia that started in 1980 and was to take seven years to complete two functional prototypes.

SOTI Board of Directors, February 1985

• Muhammad Jisam Hanash	President of SOTI
• 'Amir Hamudi Hasan Al-Sa'di	Vice President of SOTI
• Hamid Yusif Hammadi	Secretary of the President
• Director, Procurement and Supplies	Ministry of Defense
• 'Adnan 'Abd al-Majid Al-'Ani, Director, State Org. of Industrial Design and Construction.	Ministry of Industry
• 'Amir Muhammad Rashid Al-'Ubaydi, Director, Research and Development Institute	Ministry of Defense

eliminating the need for Ramadan's position. Neither was an industrial specialist by training. Their primary qualification was loyalty to Saddam.

Upon his return, 'Amir Al-Sa'di found that SOTI was having problems fulfilling the Army's munitions requirements, particularly for heavy artillery rounds and mortar shells. The outnumbered Iraqi Army was locked in a trench-warfare stalemate with Iran, which forced the Iraqis to rely heavily on artillery and mortar munitions. Al-Sa'di took over Al QaQa'a State Establishment, the principal propellant and explosives manufacturing facility, for a month and a half to solve production problems at its munitions factories, after which he returned to the management of SOTI.

The Husayn Kamil Era (1987-1995)

Creation of the Military Industrialization Commission

SOTI was renamed the Military Industrialization Commission (MIC)¹ in late 1987. The starting point for this change was in early 1985 or early 1986 when Husayn Kamil, with Saddam's blessing, inserted himself informally in SOTI affairs, and then in February 1987 ousted its head Muhammad Jisam Hanash, and seized an active role in managing SOTI. 'Amir Al-Sa'di became SOTI President under Kamil's supervision. Kamil never assumed a formal title in SOTI. At the time, he was the Director of the Special Security Organization (SSO) and Supervisor of the Republican Guard (RG), including the Special Republican Guard (SRG). To ensure that Al-Sa'di understood that he was subordinate to Kamil, Kamil appointed Al-Sa'di as Deputy Director of the SSO for Military Production for a brief period, but Al-Sa'di contends he never had any SSO or security-related responsibilities.

SOTI and MIC Acquisition of WMD Programs and Key Industrial Facilities

Between 1986 and 1988, SOTI and then MIC were very successful, enjoying public admiration and prestige, and attracting talented personnel to its ranks. This organization, particularly under Husayn Kamil's influence, became a predator gobbling up various organizations and projects, such as the Petrochemical Project No. 2 (PC-2) and the Dawrah Factory (an industrial workshop)² from the Ministry of Oil

¹ In its original Arabic form, "*hi'at al-tasnia' al-'askarri*" can be translated various ways. "*Hi'at*" is "organization," "corps," "corporation," "association," "society," and a number of other meanings. "*Al-tasnia' al-'askarri*" is "military industrialization." Therefore, "Military Industrialization Commission," "Military Industrialization Organization," and "Organization of Military Industrialization" are synonymous translations. The Iraqis refer to the entity in English as the Military Industrialization Commission (MIC).

² In 1990, MIC commissioned the State Establishment for Heavy Engineering Equipment (SEHEE), a new, much bigger facility built next to the Ministry of Oil's former Dawrah Factory, according to Al-Sa'di.

Development of Extended Range Scud missiles

During the Iran-Iraq war, Iran acquired Scud missiles and launchers from Libya. Baghdad was within range of the newly acquired Scuds from firing positions well inside Iranian territory, and missiles began hitting Baghdad every few days. Iraq possessed Scud missiles with one-ton high-explosive warheads but could not retaliate because the Iranian capital was well beyond the missile's 300-km range. This sparked frantic Iraqi efforts to obtain missiles with a minimum 600-km range—at any price—but overtures to Russia, China, and Brazil failed. Iraq embarked on a \$2 billion joint project with Egypt for the development and production of the Badr 2000, a 750- to 1,000-km range missile with a 560-kg payload, but this project was not expected to produce such a missile for four to five years.

1987 was the turning point both in SOTI's versatility and the fortunes of the Army at the battlefield. SOTI extended the range of Iraq's Scuds to deliver a 300-kg high-explosive warhead 650 km. Every Scud missile hitting Baghdad was answered with 10 Al Husayn missiles (Iraqi modified Scuds) fired at Tehran. Senior Regime figures believed this turnabout contributed to Iran's acceptance of Iraq's offer of a reciprocal halt to missile attacks on the capitals.

(MoO); the General Establishment for Iron and Steel in Basrah and Nasr State Establishment from the Ministry of Industry; the State Establishment for Pesticide Production (SEPP), which was a chemical weapons program, and the Military Research and Development Institute from the Ministry of Defense (MoD); and the Technical Research Center, which included the Regime's nascent biological warfare program. MIC also took over the Petrochemical Project No. 3 (PC-3), Iraq's nuclear weapons development project, in 1988 (for additional details see Annex B: SOTI—MIC Acquisitions, Mergers, and Expansion and Annex C: Saddam Husayn and Military Industrialization).

Creation of the Ministry of Industry and Military Industrialization

Husayn Kamil wanted Iraq's entire industrial apparatus under his control, including the Ministry of Industry. Saddam divided the Ministry of Industry and Minerals (MIM) in 1982 to create a Ministry of Industry (sometimes referred to as heavy industry) and a Ministry of Light Industry. The Ministry of Industry controlled the heavy industries, including sulfur and phosphate mining and processing these minerals into fertilizers; the chemical industry for producing petrochemicals, plastics, and rayon; paper mills; and electrical power generation and distribution; and the State Organization for Engineering (Mechanical, Electrical, Electronic) Industry. The Ministry of Light Industry controlled dairy and food production, textiles, and other consumer products.

In July 1987, Husayn Kamil stepped in as Acting Minister of Industry for about one month, replacing Kasim Al-'Urabi (who was undergoing medical treatment in Germany), and attempted to rearrange key facilities in the ministry. Eight months later, a major consolidation occurred under Husayn Kamil.

In March 1988, Kamil combined MIC with the Ministry of Industry and the Ministry of Light Industry to form the Ministry of Industry and Military Industrialization (MIMI). Saddam appointed Husayn Kamil as the Minister of Industry and Military Industrialization. 'Abd al-Tawab 'Abdallah Al-Mullah Huwaysh, the Minister of Industry at the time, felt that this was a direct result of Kamil's successful campaign to undermine his position. Huwaysh, who earlier served Kamil loyally, nevertheless considered him unqualified and did not hide his disdain. Saddam would not tolerate Huwaysh's open humiliation of Kamil (and by extension Saddam's family). Huwaysh and the Minister of Light Industry both lost their jobs to Kamil, according to Huwaysh.

'Amir Al-Sa'di and 'Amir Rashid, whose Research and Development Institute was earlier folded into MIC, were given tremendous authority, as long as they honored and respected Husayn Kamil. Al-Sa'di's title changed to Senior Deputy Minister of MIMI for Military Production, other deputy ministers included 'Amir Rashid, responsible for military R&D; 'Adnan Al 'Ani, responsible for civilian industries; and

Ahmad Al Dulaymi, responsible for electrical power production and distribution, as well as head of the trade unions. Dr. Ja'far Diya' Ja'far Hashim became the fifth deputy minister of MIMI, when Husayn Kamil took control of the Iraqi nuclear weapons program later in 1988.

Saddam's creation of an industrial super ministry under Husayn Kamil's supervision was designed to lead Iraq technologically into the 21st century, according to one Iraqi official. MIC's strength, as the centerpiece of MIMI, lay in its sound planning philosophy, including particular attention to workforce training prior to project initiation, and its in-house design and construction capability for buildings and other large structures.

Post-Desert Storm Changes to MIMI

In the turmoil following the 1991 Gulf war, Saddam initiated a major shake-up of the Council of Ministers, appointing Sa'dun Hammadi—a veteran Ba'th Party member and Shia—as Prime Minister, and Husayn Kamil as the Minister of Defense. As a result, 'Amir Al-Sa'di became the Minister of Industry and Military Industrialization for a period of about five months; Al-Sa'di also served briefly as the Acting Minister of Oil following the shake-up. ***During the summer of 1991, MIMI dissolved, leaving MIC and the former Ministries of Industry and Light Industry as individual components. MIC became independent, whereas the two remaining entities, once again, merged into the single Ministry of Industry and Minerals (MIM), identical to its pre-1982 state.***

In September 1991, after the restoration of refineries and power stations destroyed in the war, Husayn Kamil called Al-Sa'di and told him that he (Al-Sa'di) was only the MIM Minister—that is, that MIC reverted to the control of the Presidency. Husayn Kamil got into a dispute with Minister of Agriculture Mahmud Dhiyab Ahmad over the reconstruction of the *Jumhuriyah* (Republic) Bridge in Baghdad, and Kamil resigned as Minister of Defense the first week of November 1991. 'Ali Hasan Al-Majid replaced Kamil as the Minister of Defense, which left Husayn Kamil without a ministry.

Ja'far Diya' Ja'far, who had become the Deputy at MIC in April 1991, became the Acting Director of MIC in November 1991 and continued in the post for about a month. In late November or early December, either Minister of Defense 'Ali Hasan Al-Majid or Secretary of the President 'Abd Hamid Mahmud Al Khatab Al Nasiri called Ja'far and told him he was being transferred from MIC to the MIM. 'Amir Rashid, as the only remaining former MIMI Deputy Minister, then succeeded Ja'far at MIC with the title Senior Deputy Director, which he retained until February 1992, when Husayn Kamil returned to MIC. Ja'far became head of the electrical power generation and distribution enterprise within MIM under Al-Sa'di.

By the summer of 1994, Rashid began to attend Council of Ministers meetings in Husayn Kamil's absence and at his urging. Kamil was receiving medical treatment at the time in Jordan for a brain tumor. 'Amir Rashid remained MIC Director until July 1995 when he became the Minister of Oil, though he was recalled to MIC for several months following Husayn Kamil's defection to Jordan the following month.

Husayn Kamil returns to MIC

In February 1992, Saddam reinstated Husayn Kamil as Supervising Minister overseeing MIC, MIM, MoO, and the Iraqi Atomic Energy Commission (IAEC), and as head of the minister-level Economics Committee. 'Amir Rashid acted as Kamil's deputy, though his formal title was Director of MIC, which he retained until July 1995. 'Amir Al-Sa'di, now Minister of Industry and Minerals, sought the return of several enterprises poached from MIM in the 1980s, including Nasr State Establishment, General Establishment for Iron and Steel in Basrah, and a plant in Waziriyah, Baghdad. Husayn Kamil, however, refused to return these companies to MIM.

When Husayn Kamil returned as the Supervising Minister, he directed the reconstruction of MIC facilities destroyed during the 1991 war and tried to expand MIC into civilian production. MIC and the former nuclear weapons program (PC-3) personnel and resources played an important role in restoring Iraqi infrastructure, including refineries, power stations, and bridges.

During this period, however, UN sanctions and inspections imposed huge restrictions on MIC. A lot of equipment that was used or purchased for the WMD program was at risk of destruction by the UN. Iraq was required to prove to the UN Special Committee (UNSCOM) that a machine had not been used in proscribed programs to save the machine from destruction.

MIC was also strapped for resources. All of the ministries fought for resources, including hard currency, within the ministerial Economics Committee. SOTI and MIC received a substantial percentage of money from oil revenues during the 1980s, but this went to zero after 1991. While it did not help its financial situation, MIC became involved in printing Iraqi currency during this period.³ After the invasion of Kuwait, Iraq switched the printing of its currency from the United Kingdom to MIC. (Serial numbers were added to the bills by the Central Bank, however.)

'Amir Al-Sa'di Ousted From MIM

On 4 September 1993, the Presidential Diwan instructed 'Amir Al-Sa'di to turn over MIM to Husayn Kamil, who told Al-Sa'di the change was being made for "administrative reasons." Al-Sa'di has stated that he expected this removal, as reconstruction was mostly finished, he was not a member of the Ba'th Party, and Saddam had taken Ahmad Husayn Khudayr Al-Samarra'i's place as Prime Minister,⁴ which provided Kamil additional leverage to influence Al-Sa'di's removal. According to an acquaintance of Al-Sa'di, Kamil took Al-Sa'di's ministerial position because Kamil wanted to become a minister again and because there was money to be made through control of MIM. Husayn Kamil remained the Minister of Industry and Minerals and the Supervisor of Military Industrialization until he fled to Jordan in August 1995.

³ According to Dr. Amir Al-Sa'di, the British company De La Rue printed Iraqi currency, and a shipment of Iraqi currency was on its way to Iraq in 1991 but was stopped in Malta because of the imposition of UN economic sanctions. Consequently, Iraq began to print its own currency.

⁴ Dr Saq'dun Hammadi, who was appointed Prime Minister in April 1991, was ousted 18 months later. Muhammad Hamza Al-Zubaydi replaced him. Al-Zubaydi lasted about nine months and was replaced as Prime Minister by Ahmad Husayn Khudayr Al-Samarra'i who had served as Finance Minister since April 1991.

Husayn Kamil's Demise

By 1995, UN sanctions had caused serious disruption of the Iraqi economy. Kamil's capricious and self-serving oversight of MIC, his lack of accountability, and the intrusive nature of UN inspections combined to erode Iraq's military industrial capability. Husayn Kamil, his brother Saddam Kamil, their wives and children (Saddam Husayn's grandchildren), and a handful of others sought political asylum in Jordan on 9 August 1995. According to Huwaysh, Kamil took with him several million dollars that he had withdrawn from MIC bank accounts.

Various reasons may explain why Husayn Kamil left Iraq. The most important reason may have been the growing tension between him and his bitter family rival 'Uday Saddam Husayn. According to King Hussein of Jordan, "as far as we know, it was a family feud on the personal level which went on for a rather long period of time." A further explanation revolves around the terrible state of the Iraqi economy under sanctions and the possibility that he wanted to escape Iraq before a popular or tribal revolt unseated Saddam and his family. For his part, Husayn Kamil said Saddam's rule had "lost its creditability on the international and Arab level," and that his defection "shows to what extent the situation in Iraq has deteriorated." The Iraqi media and leadership first

accused him of financial improprieties, and then said he was "no more than an employee in this state and his responsibilities were limited." Finally, they made him the ultimate "fall guy" for all Iraq's problems—from the Regime's decision to invade Kuwait to Iraq's duplicitous relations with UNSCOM.

Husayn Kamil, Saddam Kamil, and their families decided to return to Iraq in February 1996, supposedly with the promise of a pardon from Saddam. Upon their return from Jordan, he and his brother were detained, separated from their families, and placed under house arrest. Within days, Saddam's daughters divorced their husbands. While under house arrest Husayn Kamil and his brother were confronted by 'Ali Hasan Al-Majid and members of their family, come to reclaim "tribal honor." Husayn Kamil, his brother Saddam, their father, their sister and her children were killed in the ensuing shoot-out. Saddam Husayn "explicitly endorsed the killings, which, as he saw them, 'purified' and healed the family by amputating from the 'hand' an 'ailing finger.'" Trying at the same time to distance himself, Saddam assured his listeners that, had he been notified about it ahead of time, he would have prevented the assault, because "when I pardon, I mean it."

Transition (1995-1997)

‘Amir Rashid Returns as MIC Caretaker

In June 1995 Saddam advised ‘Amir Rashid that he intended to appoint him Minister of Oil, which occurred the following month. Shortly after Kamil’s flight to Jordan in August, Saddam called ‘Amir Rashid and told him to “take care of MIC” until a new minister could be found. He remained in this dual capacity as Acting Director of MIC and Minister of Oil until January or February 1996, when Saddam appointed Dayf ‘Abd al-Majid Ahmad as the new MIC Director.

While ‘Amir Rashid headed MIC he returned a number of companies poached by Husayn Kamil to their original ministries, including the Nasr State Establishment, the General Establishment for Iron and Steel in Basrah, and the State Establishment for Heavy Engineering Equipment (renamed Al Nasr Al ‘Azim in 1997). Certain companies were later reclaimed by MIC when ‘Abd al-Tawab Al-Mullah Huwaysh became Minister of Military Industrialization. ‘Amir Rashid abolished the MIC Follow-up Directorate,⁵ an instrument that Husayn Kamil used in his capacity as Supervising Minister to track production in the ministries he oversaw. ‘Amir Rashid felt there was no longer any need for such a directorate within MIC because the Supervising Minister position no longer existed.

Dayf ‘Abd al-Majid Ahmad’s Tenure at MIC

Dayf replaced ‘Amir Rashid as MIC Director in 1996. Dayf had been Deputy Director to ‘Amir Rashid since 1994 and his appointment as MIC Director freed ‘Amir Rashid to focus on MoO. Years earlier, Dayf was working at the State Establishment for

Vegetable Oil when Al-Sa’di sent him to Yugoslavia with 60 others to be trained to operate the Al Qa’qa’a munitions complex. When this group returned from Yugoslavia, Zuhayr Al ‘Ani became Director General of Al Qa’qa’a State Establishment and Dayf became the number-two official. When Zuhayr died, Fa’iz ‘Abdallah Shahin became Director General of Al Qa’qa’a. When the Director General of Al Muthanna State Establishment (MSE) was dismissed in 1987, Shahin was moved to MSE to replace him, and Dayf became Director General of Al Qa’qa’a.

According to ‘Amir Rashid, Dayf was an “honest and clean manager, though perhaps not very clever.” Saddam wanted things from him that Dayf could not deliver. Dayf, on the other hand, believed that Saddam did not favor MIC during this time. During his tenure of just over a year, Dayf’s main concern was how to operate MIC’s production plants without funds, spare parts, or raw materials. He lamented that his budget was only \$5 million a year, although carrying out traditional MIC tasks, such as producing ammunition and arms, required a minimum of \$50 million annually. MIC needed much more, if it was to continue special missile projects.

Huwaysh, however, contends that these figures are not correct and that Dayf did not even use what hard currency the government had allocated to him. Huwaysh wrote that when he took over MIC in March 1997 there was still hard currency available in MIC accounts from the previous year. ‘Amir Al-Sa’di is more supportive of Dayf, arguing that MIC’s main problem was the lack of support and funds.

On 9 March 1997, Saddam summoned Dayf and some of his subordinates to a meeting. The topics of discussion were MIC’s ongoing munitions production problems at Al Qa’qa’a and the lack of progress on the Al Samud missile. Saddam also invited ‘Abd al-Tawab ‘Abdallah Al-Mullah Huwaysh, the former Minister

⁵ According to Dr. ‘Amir Al-Sa’di, all the directors at MIC and at the state entities under MIMI hated the MIC Follow-up Directorate because it was staffed by personnel “whose qualification was arrogance and loyalty to the boss. They were perceived as the whip in the hand of the coach driver”—Husayn Kamil.

of Industry, to attend the meeting as an observer.⁶ After listening to Dayf's complaints, Saddam asked for Huwaysh's evaluation. Huwaysh was critical of MIC's failure to adopt and implement standard industrial management practices, which he felt were instrumental to solving its problems. Saddam then asked to see Huwaysh alone and inquired what he thought of Dayf. Huwaysh told Saddam that Dayf was a weak man unsuited to run MIC. Saddam agreed and said that was why he wanted Huwaysh to take the job.

The Latter Years (1997-2003)

After Husayn Kamil's departure, many of the companies and enterprises he had incorporated into MIC were returned to other ministries. MIC was rudderless under Dayf 'Abd al-Majid Ahmad. According to 'Amir Al-Sa'di, MIC's personnel were in a state of shock after Husayn Kamil's flight. Many were called for questioning and all were afraid of the ramifications of what was described publicly as Kamil's treachery and treason. By the time Saddam dismissed Dayf, MIC headquarters was already in chaos.

- MIC's primary customer, MoD, had lost confidence in MIC's capability to meet military production requirements, and MIC was seriously stressed.
- According to Huwaysh, large segments of industrial capacity were either out of service or underutilized, raw materials were in short supply, quality control was weak, MIC employees were dispirited, wages were below subsistence levels, corruption was rampant, managers and workers lacked technical skills, and there was no fiscal accountability and no adherence to accepted standards of industrial practice.
- 'Amir Al-Sa'di contends that lack of resource can cripple any enterprise—no matter how healthy it is—and that this lack of resources was really what was responsible for the dire state of MIC. Sa'di also disputed the assertion that MIC technical skills had deteriorated, and he stated that there was no corruption under Husayn Kamil, while under Dayf there were hardly any money available to be squandered or embezzled.

'Abd al-Tawab 'Abdallah Al-Mullah Huwaysh

Huwaysh was appointed to direct MIC on 9 March 1997. Concurrent with Huwaysh's appointment, Saddam chose Lt. Gen. Muzahim Sa'b Hasan Muhammad Al Nasiri as MIC Senior Deputy Director and Lt. Gen. Hazim 'Abd al-Razzaq Shihab Al-Ayyubi as Deputy Director. Both men were experienced military officers: Muzahim had commanded the

⁶According to 'Amir Al-Sa'di, this was one of Saddam's time honored practices. When problems appeared at any ministry, Saddam would send one of the many previously ousted ministers or commanders who had been kept as a presidential advisor without specific duties, waiting in the wings. The adviser would visit the problem sites, talk to people there—preferably the disgruntled one—and write a report directly to Saddam. Saddam would then call a meeting to discuss the matter in the presence of the "observer". If the observer showed eagerness and an appetite for the job, he would often be appointed to the position. For example, that was how Lt. General Muhammad Jisam got the job as President of SOTI.

Iraqi Air Force and the Fedayeen Saddam and served as a bodyguard for Saddam; Hazim was a missile officer who had commanded the Iraqi surface-to-surface missile forces during the 1991 Gulf war. Neither had any experience in managing military industry, but both had Saddam's confidence.

Over the course of time, Huwaysh's deputies took on additional roles, or left MIC altogether. For example, Muzahim Sa'b was appointed by Saddam to the Air Defense Command for six months in 2001, but he retained his position of Senior Deputy Director of MIC. Hazim remained a deputy director until he was replaced by Muyassir Raja Shalah Hassun Al-Tikriti in 2000, who subsequently was appointed Minister of MIM a year later. Dagher Muhammad Mahmud was MIC Deputy Director from 2001 to 2003.

An unlikely choice to head MIC, Saddam brought back Huwaysh, who had been languishing as a presidential advisor for nine years. Reflecting on his reemergence, Huwaysh admitted he actually relished the opportunity to have Saddam invite him back into government. He felt that Saddam's summons was an implicit admission he had been wrong to fire Huwaysh nine years earlier.

Saddam promoted Huwaysh to Minister of Military Industrialization in late 1997 and in July 2001 made him a Deputy Prime Minister. Huwaysh substantially restructured MIC by 1999, and his new framework continued virtually unchanged, except by expansion, until 2003. MIC's reemergence provided the research, technological, and industrial foundation on which Saddam hoped to rebuild and modernize Iraq's military-industrial capabilities. Drawing on these capabilities, Saddam was determined that if the Security Council could not enforce a WMD-free zone in the Middle East (as prescribed in UN Security Council Resolution 687, paragraph 14), Iraq's ability to defend itself against regional threats should be not be constrained, according to Huwaysh.

- To revitalize MIC, Huwaysh instituted strict organizational and financial reforms centered on mandatory planning, and required institutional and personal accountability. MIC immediately raised salaries across the board. Externally, MIC re-engaged with its customers, especially MoD.

- Reforms centered on one-year, five-year, and 10-year planning cycles, meticulously administered from MIC headquarters. While MIC's directors general were given broad authority to conduct business and implement these plans, Huwaysh held them directly accountable for plan performance.

- Embedded in each plan was a range of requirements covering education and training, technical research, safety, quality control, and industrial efficiency, in addition to clearly defined production goals. The plan linked these performance factors to explicit financial and promotion incentives, including a new MIC-wide bonus system approved by Saddam.

- In 1998, Huwaysh created a program to involve university academics and graduate students directly in MIC research and development efforts. The next year, he introduced incentives to encourage outsourcing of specific production projects to the private sector. Both programs flourished.

- According to 'Amir Al-Sa'di, these measures were common practices in government establishments, and many of these practices were required by law or by instructions from the Presidential Diwan.

In the years after coming to MIC, Huwaysh became the most powerful Iraqi industrial official since Husayn Kamil, rising to Deputy Prime Minister, Minister of Military Industrialization, and head of the Industrial Committee.

The Special Office and the IIS Procurement Connection

In November 1997, Saddam Husayn approved a MIC proposal to enlist the Iraqi Intelligence Service (IIS) to develop new procurement, technology transfer, and technical assistance channels to supplement existing MIC Commercial Directorate channels. Huwaysh formed the MIC-IIS relationship to support Iraq's missile program after Saddam instructed him to improve Iraq's missile capabilities.

MIC's end of this second procurement channel operated through a MIC staff section called the "Special Office," headed by Dr. Hadi Tarish Zabun Muhammad Al-'Abuddi, Director General of MIC's Research Directorate. Hadi's office handled the entire secret, special contracting process with Russia, Belarus, Yugoslavia, Ukraine, and Bulgaria.

The IIS's procurement activity operated through the IIS Scientific and Technical Information Office, designated M4/4/5. (A full discussion of the Special Office and its relationship with IIS M4/4/5 is found in the *Comprehensive Report of the Special Advisor to the DCI on Iraq's WMD*, Volume I, Regime Finance and Procurement, pp. 69-70.)

Changing of the MIC Establishment Names in March 1997

The names of some MIC entities were changed in March 1997 as a security measure. Huwaysh said that the idea for the name change originated with him and was designed to conceal the nature of the establishment business. The State Establishment for Industrial Chemical Research, for example, became Ibn-Sina Center. Most of the renamed establishments had been created after the 1991 war, and these were given the same type of classical Arab names that had long been used with other MIC establishments.

Conversion of State Establishments, Centers, and Factories to Companies

On 1 August 1998, all MIC establishments, autonomous centers, and autonomous factories were redesignated as state companies. This change was required by the new Law of Companies as a move toward self-management and financing, and applied to all state establishments, not just those in MIC. Huwaysh saw the change as a way to boost the authority of the heads of factories and centers. The heads of factories and centers carried the rank of director. To raise their

status, he elevated them to the rank of director general, the same as the heads of other state companies.

The conversion to state companies also forced MIC's establishments, centers, and factories to adopt a common staff structure, with technical directorates, design and research directorates, training directorates, and so forth. Finance departments were redesignated as economics departments in an effort to broaden the view of establishment finance officials. Huwaysh also required the implementation of training and quality control programs in all MIC companies.

For discussion of post-1998 improvements in the Iraqi munitions industry (see Annex E).

Funding MIC With Oil Revenues

The UN Oil-For-Food Program (OFF) began in 1997 and operated without interruption until the 2003 war. The UN Security Council (UNSC) not only renewed the original OFF mandate under UN Security Council Resolution (UNSCR) 986, but raised the revenue ceiling for Iraqi oil exports in October 1999 with UNSCR 1266. The revenue ceiling was then eliminated with UNSCR 1284 (although the resolution reaffirmed sanctions). The former Regime managed to collect significant hard currency revenues by illicitly exploiting the OFF contracting process increasing monetary returns directly to the Iraqi Government as the UNSC raised oil production ceilings, increasing benefits to the Iraqi people as the UNSC raised oil production ceilings. Iraq controlled the contracting process for both selling its oil and arranging purchases of humanitarian goods, which allowed it to take advantage of lax UN oversight.

As a result, between 1996 and 2002, the MIC budget increased over forty-fold from Iraqi dinar (ID) 15.5 billion to ID 700 billion, despite ongoing UN sanctions and Coalition attacks on its facilities. In 2002, MIC negotiated short- and long-term, hard currency procurement contracts amounting to approximately USD 364 million. MIC front companies adapted to

changing circumstances by importing significant amounts of technology and raw materials through formal, but technically illegal, arrangements with Syria, Turkey, and Jordan (for additional information on MIC's funding practices, see the *Comprehensive Report of the Special Advisor to the DCI on Iraq's WMD*, Volume I, Regime Finance and Procurement chapter).

Over the course of 31 years, Iraq's military industrial complex grew, absorbing and acquiring numerous entities. From its inception, as an institution within

Iraq MIC had historical continuity, however organizationally, it evolved over time reflective of its leadership and historical circumstances. This evolution can be simplified into the periods before, during, and after Husayn Kamil, and the period of 'Abd al-Tawab Al-Mullah Huwaysh. See Annexes A through D for additional details on Iraq's military industrial leaders, facilities, and programs, and how Saddam influenced the entire enterprise.

Overall, MIC was seen by the Regime as a reflection of the strong Iraqi character of being builders and engineers.

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Annex A
Influential
Personalities of Iraq's Military
Industrialization

Lt. Gen. Dr. 'Amir Hamudi Hasan Al-Sa'di

'Amir Al-Sa'di formed the Follow-up and Executive Committee (FOLEX) to plan, negotiate, and implement a program to develop Iraq's military industries in 1972. When the State Organization for Technical Industries (SOTI) was formed in April 1974, he sat as the Vice President of SOTI for seven years.



Al-Sa'di went to Yugoslavia from 1981 to 1985 as a technical advisor for the Ababil-50 multiple launch rocket system. He was recalled in 1985 to return as the Vice President of SOTI to assist the organization's oversight of munitions production during the Iran-Iraq war. In February 1987, he was promoted to SOTI President under the supervision of Husayn Kamil. During the summer of 1988, Al-Sa'di was promoted to Senior Deputy Minister of the Ministry of Industry and Military Industrialization (MIMI) for Military Production, again under Husayn Kamil.

Following Desert Storm, Al-Sa'di was promoted to Minister of MIMI and Acting Minister of Oil, until the Military Industrialization Commission (MIC) was stripped from MIMI during the summer of 1991, leaving him as the Minister of MIM. Husayn Kamil pushed al-Sa'di out of this position in September 1993. From 1993 to 1995 Al-Sa'di served as the supervisor of the Al Samud missile. 'Amir Al-Sa'di remained a Scientific Advisor to Saddam Husayn up to Operation Iraqi Freedom (OIF).

Lt. Gen. Dr. 'Amir Muhammad Rashid Al-'Ubaydi

'Amir Rashid's start in military industry began in 1984 as he was appointed head of the Ministry of Defense's commission of military research and development. In February 1985 he was appointed to SOTI's Board of Directors, and his Research and Development Institute was absorbed by MIC in 1988.



Rashid was promoted to Deputy Minister for Military Research and Development at the formation of MIMI during the summer of 1988. He served in this capacity until he was appointed Minister of Oil in late June or early July 1995, but he consecutively served as MIC's Acting Director when Husayn Kamil Hasan Al-Majid defected to Jordan in August 1995. This lasted until the beginning of 1996 when Dayf Al-Majid assumed the MIC directorship.

'Amir Rashid retired as the Oil Minister in late 2002, and he was appointed as a Presidential Advisor. He only served as a Presidential Advisor for about one or two months in 2003 before Saddam recalled him as Minister of Oil. (Samir 'Aziz Al Najim served as Minister of Oil during those two months.) 'Amir was the Minister of Oil at the start of the 2003 war.

Gen. Husayn Kamil Hasan Al-Majid¹

Born in 1955 within the Al-Majid branch of Saddam's family, Husayn Kamil was the son of Saddam's first cousin on his father's side, Kamil Hasan Al-Majid. More importantly, Husayn Kamil became Saddam's son-in-law, married in 1983 to Saddam's eldest and favorite daughter, Raghad. Husayn Kamil began his rise to power within the Regime's security services as part of Saddam's personal detail. According to Tariq 'Aziz, Husayn Kamil was a second lieutenant when Saddam became president in July 1979.



In 1983, Saddam appointed him Director of the SSO and later Supervisor of the Republican Guard (including the Special Republican Guard). In effect, he controlled all of Saddam's security organizations, an unprecedented level of trust for any single individual. In 1987, Saddam appointed Husayn Kamil as Supervisor of Military Industrialization. He rose to Minister of Industry and Military Industrialization in 1988 after acquiring the Ministries of Industry and Light Industry as well as exerting control over the Ministry of Oil (MoO), the Iraqi Atomic Energy Commission (IAEC), and Petrochemical Project No. 3 (PC-3), Iraq's clandestine nuclear program. By 1990, Husayn Kamil was, very likely, the second most powerful man in Iraq.

Husayn Kamil received broad administrative and financial authority from Saddam to consolidate Iraq's research and development programs and industrial resources to support military production, including production of WMD and missile delivery systems. Although not technically trained, Kamil oversaw

Iraq's program to modify the Regime's Scud missiles to the longer-range Al Husayn variant, and the development and production of nerve agents, including tabun, sarin and VX.

His relationship with Saddam gave Husayn Kamil opportunities to act outside the law and with minimal personal and fiscal oversight. Because of his family ties and proximity to Saddam, he could have anyone fired or placed under suspicion. Although 'Amir Al-Sa'di was the Deputy Director of MIC and a key subordinate, Kamil did not rely on deputies. A former subordinate noted: "Husayn Kamil did not have a right-hand man, as he was too arrogant." His successor at MIC, who was also one of Kamil's former subordinates said, "No one in MIC could control him, and everyone feared him."

'Abd al-Tawab 'Abdallah Al-Mullah Huwaysh

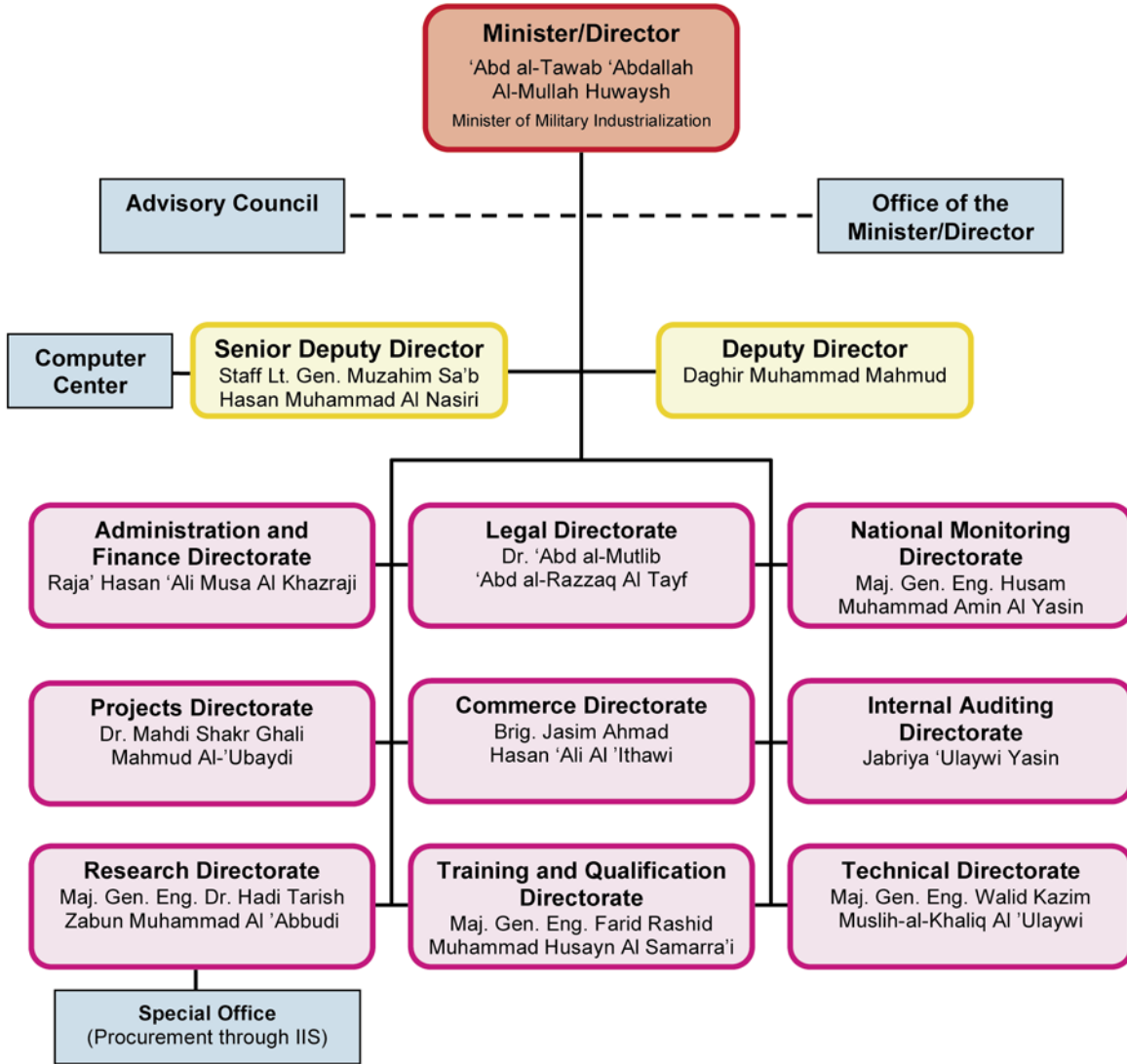
Huwaysh served in the Ministry of Industry from 1982 to 1988 and rose to Minister of Industry until the formation of MIMI and transfer of his position to Husayn Kamil. Huwaysh continued in government service as a presidential advisor as well as working in the private sector for nine years until his appointment as MIC Director in 1997. Within less than a year's time of Huwaysh's return to government service, Saddam appointed Huwaysh the "Minister of Military Industrialization," (though there was no ministry of military industrialization) and in July 2001, Deputy Prime Minister. Credited with turning MIC around after its decline in the wake of Husayn Kamil's defection and maintaining operations under UN sanctions, Huwaysh was the last Director of MIC prior to OIF.



¹ From the *Comprehensive Report of the Special Advisor to the DCI on Iraq's WMD*, Volume I, Regime Strategic Intent, p. 45.

MIC Directors General at the Initiation of OIF

Huwaysh added the Office of the Minister/Director (he called it Private Office). He moved the Special Office under Hadi Tarish (in the Research Directorate) and added the Computer Center connected to Muzahim Sa'b, who oversaw it.



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Annex B

SOTI—MIC Acquisitions, Mergers, and Expansion

Both the State Organization for Technical Industries (SOTI) (beginning in 1986) and the Military Industrialization Commission (MIC) (after its creation in late 1987), developed appetites for grabbing and taking over projects, plants, and establishments belonging to other ministries or Iraqi Government agencies. Sometimes these other organizations were facing financial trouble due to lack of budget allocations or other reasons tied to Iraq's prolonged war with Iran. SOTI-MIC raids and takeovers included the following:

State Establishment for Pesticide Production and Chemical Weapons

In 1987, the Ministry of Defense (MoD) relinquished control of its chemical weapons production facilities, the State Establishment for Pesticide Production (SEPP), to MIC. MoD had built and nurtured SEPP since its inception in 1981. In November 1981, Staff Maj. Gen. Nizar 'Abd al-Salam Ra'uf Al 'Attar, Director of the MoD Chemical Corps, began to work on chemical agent preparation at a small lab at Shammaiya in northeastern Baghdad with a group of Chemical Corps officer chemists. Maj. Gen. Nizar was considering expansion of this work at a suitable location.

'Amir Al-Sa'di, at that time the SOTI Vice President had a suitable location: the then-defunct facilities at Al Hasan Ibn-al-Haytham (Al Hasan) [alternative spelling Al Hazan Ibn Al Haitam]. The equipment formerly associated with Al Hasan remained unused since its closure in 1975, and the buildings at the site, the future location of Al Muthanna State Establishment (MSE), included several unfinished structures. 'Amir Al-Sa'di offered the site to Maj. Gen. Nizar along with leftover Al Hasan equipment, some still in its original crates. 'Amir Al-Sa'di considered SOTI an organization for conventional weapons production; he was not interested in getting involved with other types of weapons with which MIC had no experience. When SOTI took over Al Hasan in 1975, 'Amir Al-

Sa'di dissolved the biological weapons (BW) and the chemical weapons (CW) research sections and sent CW personnel back to the Army Chemical Corps. To make his proposition more attractive to Nizar, Al-Sa'di offered to have the SOTI contracting company, Sa'd State Establishment, complete the buildings at the site for SEPP.

When 'Amir Al-Sa'di returned from Yugoslavia to SOTI in 1985, he saw how successful Nizar was in his project. SEPP was supplying the Iraqi Army with chemical munitions using empty 155-mm artillery shells procured from Spain originally designed for white phosphorus. SEPP replaced the white phosphorus in these rounds with mustard agent. SEPP similarly modified LD250 aviation bombs, originally designed for high explosives, for use with mustard agent.

Al-Sa'di recognized the feasibility and economy of combining SOTI-produced shells, bomb bodies, explosives, propellant powders, and fuses with SEPP's chemical agents. MoD procurement officers, however, preferred to deal with foreign munitions suppliers, rather than using an Iraqi Government organization. In some cases, the motivation for this preference had nothing to do with the quality of indigenously produced munitions. Foreign suppliers often provided lucrative contracts with fringe benefits for the procurement officers, including VIP treatment on travel abroad. Such amenities were much more attractive than doing business with another government department within Iraq. Importing munitions components, however, drained scarce hard currency from the Iraqi Government. Not only were foreign munitions more expensive than those produced locally, but shipment by air into Iraq was also very costly. MoD bore these costs willingly and with very little accountability because SEPP was a secret project, and its CW-production capabilities were critical to the Iraqi war effort against Iran.

This began to change in 1986 when Minister of Defense Staff Gen. 'Adnan Khayrallah, Saddam's brother-in-law, sought help in controlling SEPP's high

spending costs. Nizar was spending large amounts of hard currency to have foreign contractors build nonspecialized structures such as a fully finished library, a mess hall with kitchen, a VIP restaurant for the officers, a housing area for the employees, and lakeside villas with entertainment and recreations centers for the officers. All were fully furnished from abroad. The construction arm within SOTI could have built these facilities at much lower cost.

Saddam ordered SOTI to take responsibility for SEPP's nontechnical and administrative activities and audit SEPP's accounts. Approximately 18 months later (in 1987 when SOTI was transitioning to MIC), Saddam directed Husayn Kamil to assume control of SEPP and fire its Director General, Staff Maj. Gen. Nizar. After a MoD inquiry into SEPP's affairs, a few SEPP personnel were jailed. Kamil appointed Col. Fa'iz 'Abdallah Shahin, who was the Director General of SOTI's Al Qa'qa'a State Establishment, as the new SEPP Director General, and SEPP became MSE. Shahin was a chemist who was originally trained as a Chemical Corps officer; MSE thrived under his leadership.

Technical Research Center and Biological Weapons

A small group of biologists led by Dr. Rihab Rashid Taha Najm Al 'Azzawi joined SEPP in 1985 to study the physiological effects of chemical agents. Rihab's mentor, biology professor Dr. Nasir 'Abd al-Husayn 'Abd al-'Amir Al Hindawi, suggested that she work on BW agents and expressed a willingness to supervise her work on a part time basis. Maj. Gen. Nizar, who was still Director General of SEPP at that time, readily agreed and the small group started work under Nasir. By 1987, their agents of choice were mainly *Bacillus anthracis* and *botulinum* toxin.

The new Director General of MSE, Col. Fa'iz, carefully considered the work of the BW group. The effort was at a decision point and Col. Fa'iz had either to expand the work (which he did not want to do because MSE was essentially a CW facility) or to get rid of the group. Husayn Kamil became familiar with the BW group's work and decided to take the group

under his wing. In the second half of 1987, Kamil moved the group to the Technical Research Center (TRC) at Salman Pak. Kamil had taken over the TRC in February after he assumed control over SOTI. At TRC he could directly oversee the group's work.

TRC's functions included chemical and biological analysis of food and beverages for Saddam and other VIPs. TRC worked on special electronic equipment for secure communications and surveillance countermeasures. When he took over TRC, Husayn Kamil replaced the organization's director and selected Dr. Ahmad Murtada Ahmad Khalil Al Zuhayri, the Director General of Badr State Establishment, to serve both as the new TRC Director General and to continue as the Director General of Badr.

The BW group expanded its activity with continued support by TRC and under tight controls by Husayn Kamil. In 1989, the group again moved to a new site and became an establishment known as Al Hakam. While the BW group's work suffered from the isolation of tight security and a lack of experience, it eventually succeeded in creating large amounts of biological agents that were used to fill R-400 bombs and Al Husayn (Iraqi-modified Scuds) missile warheads.

Military Research and Development Organization

The Ministry of Defense created the Military Research and Development (R&D) Organization in November or December 1983 and initially had only one employee, 'Amir Muhammad Rashid Al-'Ubaydi. 'Amir Rashid was assigned an office, a driver, and one soldier. The Minister of Defense designated him a Deputy Commander of the Air Force and promoted him to Lieutenant General in January 1984. He built his organization over the next few years, accumulating 50 to 60 personnel, composed mainly of military but also university academics.

The mission of the Military R&D Organization was tactical—artillery, armor, naval, air force, radar, and air defense, but not weapons of mass destruction. It dealt with air-to-air and short-range surface-to-surface missile systems. The Military R&D Organization

maintained a liaison relationship with SOTI because it had no infrastructure; it was only a think tank that “worked through other elements.”

As ‘Amir Rashid had no laboratories or workshops of his own, he proposed to take over the SOTI’s Al Kindi Research Center in Mosul. He lobbied the Presidential Secretary and the MoD Director of Procurement and Supplies who, together with ‘Amir Rashid himself, made up half of the SOTI board of directors. SOTI Vice President ‘Amir Al-Sa’di opposed the transfer, as did the SOTI president and the MIM representative on the SOTI board, and thus the proposed transfer was not approved by the board.

The Presidential Secretary presented the SOTI board’s decision on the matter to Saddam, and Saddam sent Husayn Kamil, who was a major at the time, to listen to further discussion of the matter at another SOTI board meeting. According to ‘Amir Al-Sa’di, this meeting was Husayn Kamil’s introduction to SOTI and the first time Al-Sa’di had seen Kamil. Kamil listened carefully, did not say much, and the decision of the previous board meeting on the Al Kindi issue stood. Al-Sa’di stated that he subsequently became familiar with ‘Amir Rashid’s staff and worked together with them for a while. He then suggested that Husayn Kamil bring ‘Amir Rashid’s whole R&D organization, including the boss, ‘Amir Rashid, into MIC.

When it appeared that Husayn Kamil had designs on the Military R&D Organization, ‘Amir Rashid advised MoD Chief of Staff Nizar Khazraji that it would be in MoD’s best interest to retain control of the Military R&D Organization. Despite this warning, MoD transferred it to Kamil in the spring of 1988, although ‘Amir Rashid initially remained in MoD, Kamil came to MoD the next day with an order from Saddam to transfer ‘Amir Rashid also. When ‘Amir Rashid arrived at MIC to continue his work in military R&D, Kamil accepted him warmly and appointed him to Director General.

Petrochemical Project No. 2 (PC-2)

PC-2 was one of the largest projects approved by the Iraqi leadership for the Ministry of Industry, but a contractor was never selected for the project because of a lack of funds. It would have been Iraq’s second major petrochemical complex. The first, Petrochemical Project No.1 (PC-1) in Al Zubayr, was commissioned in 1980 at the start of the conflict with Iran, but the plant shut down after production trials because of its proximity to the war danger zone along the Iranian border. PC-1’s capacity was about 120,000 tons of polyethylene and PVC, and its feedstock was gas from the gas separation station in the southern Iraq oil fields.

PC-2 had a design capacity of 1.25 million tons of polyethylene and other polymer products, roughly ten times the capacity of PC-1. MIC took over PC-2 with the understanding that MIC would be the prime contractor for civil engineering and infrastructure work on the project. MIC planned to award separate subcontracts to various suppliers for petrochemical processing equipment and technology. The Iraqi Government signed a contract with the US company Bechtel for overall consultancy. Work was in progress on PC-2, when the Gulf war started in January 1991.

Central Refinery

PC-2 was to obtain its feedstock from the nearby strategic gas pipeline and draw on other basic materials to be extracted from a refinery that was to be built adjacent to the PC-2 complex. The Ministry of Oil (MoO) completed planning and design work for this refinery, but construction did not begin because of the Iran-Iraq war. MIC then took over the project and continued with the MoO plan to build the refinery at Jurf-al-Sakhr, west of the Euphrates River. MIC had begun construction when the 1991 Gulf war intervened. The refinery had a design capacity of about 250,000 barrels per day of petroleum.

State Establishment for Heavy Engineering Equipment (Al Nasr Al 'Azim Company)

When MIM gave up PC-2 and MoO gave up the Central Refinery, MIC asked for and obtained the Al Dawrah factory, which produced heat exchangers for oil refineries as well as other heavy engineering equipment. This factory consisted of a workshop with an overhead crane and some welding, cutting, and rolling equipment. Immediately after taking over the facility, MIC drew up plans to build a completely new plant to produce a full range of equipment needed by the MoO and its refineries—large boilers, pressure tanks and tubes, reactors, and vessels for various purposes—plus stainless steel vessels and other items used in the chemical, food, and pharmaceutical industries. The amount of capital invested in the facility was over 100 times the original amount invested by the MoO. The original plant's experienced personnel easily adapted their skills to the activities, and new graduates of MIC's training centers joined them.

MIC completed the plant's first expansion in 1990, naming it the State Establishment for Heavy Engineering Equipment. It became the main supplier of heavy equipment to the Iraqi oil industry and was later renamed Al Nasr Al 'Azim State Company. MIC began a second expansion in 1998 that remained unfinished when war broke out in March 2003.

Oil Research Institute

The Oil Research Institute in Jadriyah, Baghdad originally belonged to the Scientific Research Council (SRC), but the Iraqi Government disbanded the SRC in 1986, another casualty of the Iran-Iraq war. MIC absorbed this well-equipped research center and its staff. After the 1991 Gulf war, the Oil Research Institute became part of Al Basil Center, later called Al Basil State Company, specializing in petroleum and petrochemical research.

The Center for Space Research and Astronomy

The Center for Space Research and Astronomy in Jadriyah, Baghdad was another Scientific Research Council component “orphaned” by the Iran-Iraq war and the SRC's demise. MIC took over the center, but did not want the astronomy component and transferred it to Baghdad University. The remaining Center for Space Research worked mainly on remote sensing and satellite communications and was a contributor to the Al 'Abid satellite launch project, eventually halted by the 1991 Gulf war. (The Al 'Abid booster was tested in late 1989, and a second test was expected in 1990, but the effort was derailed by the August 1990 invasion of Kuwait.) The Center became Al Battani State Company in the late 1990s. Al Battani engaged in the development of microwave and unmanned aerial vehicle (UAV) control technology and renewed its remote-sensing and space science research activities.

State Establishment for Iron and Steel

The merger of MIC with the Ministries of Industry and Light Industry did not happen immediately with the creation of the Ministry of Industry and Military Industry (MIMI) in March 1988. It was preceded by SOTT's takeover of specific industrial establishments considered essential for the Iran-Iraq war effort. In 1986, the Ministry of Industry shut down the iron and steel mill in Basrah, formally known as the State Establishment for Iron and Steel. The plant was located in southwest Basrah, within range of Iranian artillery positions. Iranian troops crossed the Shatt al-Arab waterway near Al Faw in February 1986 and made a determined push up the Al Faw peninsula to be stopped by the Iraqi Army just short of Basrah. There the Iranians dug in along a line stretching from the Shatt al-Arab just south of Basrah to the southwest, directly across the Al Faw peninsula to a point close to the road leading to Kuwait. Just to the north of this line were a number of facilities belonging to the Ministry of Industry, including a fertilizer plant

(urea from gas), the iron and steel mill, the PC-1 complex, the Southern Refinery, and a gas-fired power station belonging to MoO. Initially, all of these facilities were shut down when Iranian advances placed them within range of Iranian artillery.

In 1987, the Ministry of Industry restarted the Basrah iron and steel mill and the fertilizer plant, and made plans to restart the PC-1 complex by the end of 1988. The latter required reconditioning many derelict components (pipes, valves, seals, pumping stations, control panels, etc.) because the plant had been shutdown for six years, not because it had suffered damage from shelling. MIC, then MIMI, took over the Basrah iron and steel mill in 1988 because its output was essential for production of artillery shells for the Iraqi Army. MIMI was willing to accept the risk of daily bombardment by Iranian artillery and MIC's gamble paid off. After carefully studying the bombardment pattern, MIC supervisors determined that shelling occurred daily around 10 o'clock in the morning (good time for a mid-morning tea break for the workers), and it lasted for less than 10 minutes—the time needed for effective counterbattery fire by Iraqi gunners. The Iraqis also used shells with impact fuses, so even their direct hits exploded on the roof and superstructure of the workshops causing only superficial damage. For an entire year, not a single shell penetrated to the shop floor where the furnaces and rolling mills were located, and no casualties occurred.

MIC planned to expand and modernize the facility to triple its production in quantity and product range. This work was under way when the 1991 war interrupted the project.

Al Nasr State Establishment

Al Nasr State Establishment in Taji was the most advanced factory in Iraq and the Ministry of Industry's most prized possession, with modern, numerically controlled (NC) and computer numerically controlled (CNC) machines capable of manufacturing sophisticated special tools and molds. Swiss, German, and Italian firms built the plant from 1981 to 1983, under a contract that also included a six-year technical assistance package. The plant was equipped with

a modern foundry and forging shop, heat treatment and surface treatment facilities, and a factory for producing prefabricated steel structures for industrial construction. Foreign skilled labor, primarily from China, supplemented the Iraqi work force at Al Nasr. Beginning in 1986, as the conflict with Iran deepened, SOTI began to encroach on Al Nasr's facilities to increase war materiel production. The Ministry of Industry resisted, but by 1988 it was forced to turn over the entire complex to SOTI/MIC for producing components for armaments.

According to Dr. 'Amir Al-Sa'di, MIC saw that Nasr could be expanded to produce engineering equipment and products of various kinds, including machine tools and specialty steels needed for the military and civilian markets. MIC planned, constructed, and equipped new workshops between 1987 and 1990 that expanded Nasr threefold. MIC added a new foundry with state of the art special steel production capability using electroslag remelting (ESR) technology and a forging shop that could produce various articles, including artillery tube blanks and special tool steels. A new rolling mill was being equipped to produce stainless steel sheet metal and various bars and rods, but the 1991 war halted its progress. Nasr also gained a galvanizing shop and facilities for producing mobile overhead cranes, towers, and pylons. Another plant was equipped with vertical and horizontal flow forming machines and produced multiple launch rocket system (MRLS) rocket metal components. These plants became part of Nasr as it expanded under MIC until the end of 1990. The expansions later formed what became known as Al Samud and Dhu Al Fikar Companies.

'Abd al-Tawab 'Abdallah Al-Mullah Huwaysh, Deputy Minister and then Minister of Industry during this period, contended that Husayn Kamil wasted much of the precise machinery at Al Nasr casting bomb shells and making ammunition, instead of the tools and molds Al Nasr was designed to produce. Al-Sa'di maintained that in the 1987 to 1990 period, Husayn Kamil heeded the advice of his senior experts in production technology, though he pressed hard for increased output during the height of the Iran-Iraq war in 1987 to 1988. He added that there was little demand for munitions once the Iran-Iraq war ended.

State Establishment for Electrical Industry

The State Establishment for Electrical Industry in Al Waziriyah, Baghdad was the next Ministry of Industry facility that MIC acquired. Built by the Russians in the 1950s it had die casting and precision tool shops and depended on foreign skilled labor. It was running well under the Ministry of Industry, but MIC needed some of its industrial components to increase wartime production. With these components missing, the Al Waziriyah plant could not meet its production goals within the civil sector so it was ripe for MIC's total absorption.

Under MIC, the facility reached its full production capacity, including the reactivation of a light bulb production plant. Production at that plant had been halted by a lack of spare parts and raw materials.

Iskandariyah State Establishment for Agricultural Implements

This plant, built with Russia assistance in 1958, was the oldest engineering company in Iraq. It was originally called Iskandariyah Project No. 1 and was later known as the State Establishment for Mechanical Industries (SEMI). MIC took over the facility because its foundry and forge shops were needed for the Iran-Iraq war effort. Without these key components the company could no longer meet production goals for agricultural implements.

After the end of the Iran-Iraq war in August 1988, however, the plant again reached full capacity production with its full range of products. The plant also produced new products including diesel pump engines, small dump trucks, and a range of electrically driven pumps.

State Establishment for Vehicle Production

The State Establishment for Vehicle Production (SEVP) in Iskandariyah assembled Renault trucks and buses until 1979 when the Ministry of Industry determined that France was selling completed models

for 8 percent less than it cost Iraq to buy and assemble the components. The Ministry of Industry then transferred the Renault assembly line to Iskandariyah State Establishment for Agricultural Implements for tractor production. In 1980, SEVP opened a new bus factory for producing modern Reem intercity busses with Skania power trains. Iraq purchased a license agreement from US automaker General Motors to produce a range of vehicles, including Oldsmobile Delta 88 front-wheel-drive cars and Blazer four-wheel-drive sport utility vehicles. Likewise, Iraq pursued an expensive license agreement with Mercedes to produce busses and trucks. These license agreements were to be core elements of Iraq's future industrial development; however, when the Gulf war intervened, both projects stopped.

Sa'd State Establishment

Another important component of MIC's strength was building an engineering and construction group that designed and erected buildings and structures. This group started modestly in 1972 with the construction of sheds, bungalows, administrative buildings and roads. Gradually, working side-by-side with foreign contractors, they acquired experience which enabled them to compete with the best international contractors. This construction arm of military industries was inaugurated in 1974 as the Sa'd State Establishment. In 1987, it became Al Faw State Establishment. Dr. Mujbil Al Marsumi led the organization. He was a civil engineer and a charter member of the Military Industry Follow-up and Executive Committee (FOLEX) formed in 1972.

The Sa'd (later called Al Faw) Construction Company quickly attracted civil and construction engineers and architects from various idle establishments at other ministries. They took on tasks that previously they had only watched foreign contractors perform. These tasks included the design and construction of factories and bridges (two on the Euphrates at Rawa and Yusufiyah) and figured prominently in reconstruction projects after the 1991 war.

Al Faw restored Baghdad's 14 July Bridge, a suspension bridge originally built by an Austrian company in the mid-1960s. The Ministry of Housing and Construction, after inspecting the destroyed bridge, recommended the construction of a new conventional-design bridge to replace the suspension bridge. The ministry assessed it was impossible to build a new suspension bridge without foreign assistance, which was unavailable because of economic sanctions imposed on Iraq. MIC took a different view and came to the conclusion that it could salvage parts of the old structure and rebuild the bridge as it was before. Only the cable strands had to be procured from abroad, which was not impossible. The successful reconstruction of the bridge was led by Brigadier 'Abd al-Khaliq Al Azzawi. Al Faw State Establishment also built the test bed for the Supergun project.

Al Faw State Establishment expanded its activities to include the construction of hydroelectric power dams. Al Faw became involved in this business when the Ministry of Irrigation and Agriculture requested help solving its water seepage problem under the main body of the Saddam Dam on the Tigris River. Al Faw studied the problem and took part in the remedy, which required continuous grouting with fine cement under the main body of the dam. Iraqi officials decided to build the Baddush Dam 10 to 15 km south of Saddam Dam to prevent catastrophic flooding of Iraqi cities from Mosul to Basrah if the Saddam Dam failed. Al Faw took up the project in the late 1980s using about 1,000 Vietnamese workers. The Baddush project was halted by the 1990 invasion of Kuwait and never resumed, despite Husayn Kamil's efforts to revive it. The cost to complete the dam was not justified by the benefits it would provide for irrigation or power generation. In the aftermath of the Gulf war, with hard currency at a premium, there were other more cost-effective projects.

Technical Corps for Special Projects (TECO)

The Technical Corps for Special Projects (TECO) was a project management element created within SOTI in 1986 to help SOTI implement its five-year plan for expansion. TECO was involved in large, high-technology projects, both military and civilian. (TECO was not, however, involved in the construction of the

Al Hakam BW agent plant or the Fallujah CW precursor facilities.) 'Amir Al-Sa'di headed TECO, while also serving as the Vice President of SOTI.

The first section of TECO dealt with intermediate-range missile projects, using both liquid and solid propellants, including the Badr 2000 missile program and, later, Project 144, the indigenous Scud-variant manufacturing effort. This section was also involved in the Al 'Abid space launch vehicle development effort.

Section 2 was the T-72 tank project. In 1986, Iraq signed an agreement with the former Soviet Union for indigenous manufacture of the T-72 tank at the Ibn-al-Walid facility.

TECO section 3 was Petrochemical Project No. 2 (PC-2) and the Central Refinery in Jurf-al-Shakr, as previously discussed. PC-2 was originally a MIM project that was taken over by MIC. The US contractor Bechtel was a general consultant on the project, but TECO handled all project integration.

Section 4 dealt with aircraft development, including a trainer (Tucano) project, MI-8 and MI-25 helicopter projects, and an SU-25 project.

Other TECO elements also were planning for anti-aircraft missile and weapons manufacturing. Dr. Gerald Bull's projects, including the Supergun, a Gatling gun, and 155-mm and 210-mm self-propelled artillery pieces, were also TECO undertakings. These efforts began in 1987 and 1988.

Col. Husam Muhammad Amin Al Yasin headed the technical bureau within Al-Sa'di's TECO office. (Maj. Gen. Husam Amin later served as the Director General of MIC's National Monitoring Directorate and was a key figure in UN and International Atomic Energy Agency (IAEA) inspection activities.) This technical bureau had oversight of many projects, but according to 'Amir Al-Sa'di, the organizational lines were "all very loose and informal."

Huwaysh contends that TECO spent billions of dollars, with little practical application or result, in part because of corruption. When Huwaysh took over MIC he said that he found many partially completed buildings on MIC properties, which had no apparent connection to any project, and he quoted Husayn Kamil as saying, "Without work you cannot steal."

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Annex C

Saddam Husayn and Military Industrialization

Saddam Husayn's Role in Iraq's Weapons Programs

Saddam's interest in controlling Iraq's weapons programs dates back to his days as Vice President of Iraq. In the early 1970s, he became the head of the "Committee for Planning and Follow-up of Development Projects." "Development Projects" in this context encompassed everything from agriculture to industry, infrastructure to health and education, as well as the armed forces. Each government organization drew up five-year plans that required approval by the committee. Implementation of the plans in all fields started in parallel as far as financial resources from oil revenues and credits allowed. After Saddam nationalized oil production and marketing there was a considerable increase in oil prices. With the resultant increase in revenues, implementation of plans accelerated at high speed. Projects became more ambitious as they increased in number.

Saddam's personal involvement in one project or another was not a strong predictor of its rapid progress or eventual success, but it did ensure those projects a certain degree of notoriety. Likewise, Saddam's investment in high-technology research and development and indigenous weapons production yielded results that varied widely, independent of resources allocated. Saddam wanted immediate results and did not have an appreciation of the long leadtime of most industrial projects. In the early years, Taha Yasin Ramadan Al Jizrawi oversaw military industry for Saddam, but Husayn Kamil Hasan Al-Majid, Saddam's son-in-law and the son of his paternal first cousin, eventually replaced him. Neither was an industrial specialist by training. Their primary qualification was loyalty to Saddam. That pattern changed, following Kamil's 1995 defection. Saddam eventually turned to 'Abd al-Tawab 'Abdallah Al-Mullah Huwaysh, a former Minister of Industry who Saddam had fired in 1988, to lead the rehabilitation of Iraq's military-industrial complex. Angry with

Huwaysh after he humiliated Kamil in a ministers' meeting in 1988, Saddam did not talk to Huwaysh for the next nine years, but retained him on the government payroll as a presidential advisor nonetheless. Although Huwaysh was not a member of Saddam's inner circle, he was a competent engineer and manager, with a reputation for speaking his mind. After Kamil's defection, Huwaysh's earlier opposition to Kamil probably worked in his favor for selection to head MIC.

Except for a brief interregnum in 1991 to 1992 while he served as Minister of Defense, Husayn Kamil supervised Iraqi military industry and the Military Industrialization Commission (MIC) beginning in 1987 and ending with his escape to Jordan in 1995. Kamil had nearly unlimited access to Saddam because of their close ties. According to one of Kamil's senior subordinates, 'Amir Hamudi Hasan Al-Sa'di, Kamil used this access to obtain "decisions from his father-in-law, with whom he had lunch two or three times per week." *Given Kamil's close relationship with Saddam, Kamil's decisions regarding MIC were probably aligned closely with Saddam's broader strategic goals. 'Amir Al-Sa'di, however, contended Saddam showed very little interest in MIC until after the shock of Kamil's departure for Jordan.* One possible explanation for Al-Sa'di's observation is that Saddam trusted Kamil so completely he felt no need to exert control over MIC outside of his discussions with Kamil.

Saddam's relationship with 'Abd al-Tawab Al-Mullah Huwaysh, the major Regime figure who dominated Iraqi military industry following Husayn Kamil's departure, was characterized by ad hoc interventions, bereft of strategic guidance or a broad vision of MIC's role in the future of Iraq. In most cases, Saddam's style was leadership by exception. When Saddam issued "orders" he expected quick results. While he was averse to changing his mind, he would listen to a well-reasoned argument, and if

convinced it was credible, adjust his decision. *These “orders” had considerable impact on a variety of military industrial projects, some of which related to WMD issues, UN restrictions, conventional weapons production, and civilian infrastructure requirements.* Others were related to pet projects, many without technical merit, which Saddam adopted from well-meaning or unscrupulous entrepreneurs and then passed along to MIC (see Saddam’s Other Pet Projects section).

Responding to Orders

The examples below form a picture of how Saddam directed his military industrial complex, beginning as early as 1970, but with primary emphasis on the period from 1997 to 2003, and illustrate the results of his involvement.

Al Hasan Ibn-al-Haytham

Al Hasan Ibn-al-Haytham [alt. spelling Al Hazen Ibn Al Haithem] enjoyed high priority in allocation of funds and close attention from Saddam. The objectives for this project, which began in 1970, were to establish three research and development centers in high-technology fields where it would be difficult or impossible to obtain foreign assistance. The first was in the field of secure communications starting from solid state physics labs and silicon chip production, and leading to circuit design and special communications equipment production. The second area was creating laboratories for development of chemical warfare (CW) agents, leading to pilot and eventually full-scale production. The third area was creating biological laboratories for the development of biological warfare (BW) agents.

Saddam appointed Sa’dun Shakir Mahmud, Chief of the Iraqi Intelligence Service (IIS), to supervise the project, yet the project came to grief. It ended abruptly and was abandoned completely in 1975, failing because of bad management, ignorance, and fraud. The central personalities were prosecuted and punished for their roles in the failure. The remaining

pieces, including a physics laboratory, a mainframe computer (largest in Iraq at the time), some buildings at the future site of Al Muthanna State Establishment (MSE), and the Mansur electronics plant, Sa’dun handed over to ‘Amir Hamudi Hasan Al-Sa’di, then Vice President of the State Organization for Technical Industries (SOTI), to do with as he saw fit. ‘Amir Al-Sa’di dissolved the BW section and disbanded its personnel. He also dissolved the CW section and sent its personnel back to the Iraqi Army Chemical Corps. New construction for Al Hasan was stopped, and much of the equipment purchased for the project remained crated and unused.

IAEC and Nuclear Weapons Research

The Iraqi nuclear program began with the creation of the Iraqi Atomic Energy Commission (IAEC) in the 1950s. Nuclear weapons, however, were not the original goal of Iraq’s nuclear program, according to Dr. ‘Amir Al-Sa’di. Iraq wanted to acquire experience in the use of nuclear energy for peaceful purposes and signed the Nuclear Non-Proliferation Treaty in 1968. Iraq signed contracts with the Soviet Union for a small research reactor in the 1960s and in November 1976 signed a contract with France for a larger reactor. Beginning in the 1970s, Saddam began to take a special interest in and supervise IAEC activities. According to Al-Sa’di, IAEC programs took an abrupt turn toward weaponization, only after the Israelis bombed the newly installed reactor at Tuwaitha in June 1981. Al-Sa’di alleged that previous to the attack, Israel sought to undermine the progress of Iraq’s nuclear program by sabotaging key equipment while it was en route to Iraq and even assassinating Iraqi nuclear scientists. Al-Sa’di contended that Israel perpetrated these misdeeds against an Iraqi program that at the time was in full compliance with international safeguards and regulations.

Saddam formally assumed the presidency of Iraq in 1979. Following the destruction of the Tuwaitha reactor in 1981, Saddam charged Revolutionary Command Council Deputy Chairman ‘Izzat Ibrahim Al Duri with overseeing a clandestine program to build a nuclear weapon. The program enjoyed Saddam’s full support and received priority in allocation of

funds, according to Al-Sa'di. In 1987, when Saddam made Husayn Kamil his direct overseer of Iraq's military-industrial complex he also gave him responsibility for the country's nuclear program, although Kamil had no technical training whatsoever. By 1988, the number of scientists, engineers, and technicians in the IAEC exceeded 6,000 and included the brightest and best qualified in Iraq, according to Al-Sa'di. Under great pressure from Saddam to show results, Kamil and his senior subordinates provided Saddam with a series of glowing reports on the progress of the nuclear program. According to Dr. Mahdi Ubaydi, one of Iraq's leading nuclear scientists who was then working on uranium enrichment, "everyone deceived each other in order to survive." In reality, according to Al-Sa'di, the nuclear program was falling short of the objectives briefed to Saddam. Eventually, Al-Sa'di contended, rivalries and jealousies took hold, and critical reports from disgruntled scientists reached Saddam revealing the program's major inadequacies.

To address this problem, Saddam directed MIC and IAEC to meet at the level of project leaders and scientists in the presence of their respective supervisors—Husayn Kamil for MIC and Dr. Humam 'Abd al-Khaliq Abd-al-Ghafur for the IAEC—to review the progress of individual projects and to identify shortcomings and suggest remedies. According to Al-Sa'di, after two such meetings, Saddam surprisingly divided the IAEC into two components. He transferred the weapons program to Kamil, directing the creation of Petrochemical Project No. 3 (PC-3) complex, comprised more than 3,000 of Iraq's top nuclear scientists, engineers, and technicians managed by Ja'far Diya' Ja'far Hashim. Civilian nuclear applications remained in the IAEC. According to Al-Sa'di, after the creation of PC-3, the nuclear weapons program accelerated and expanded its range of activities. Al-Sa'di maintained that the history and achievements of the nuclear weapons program are well documented in Iraq's December 2002 Completely Accurate, Full, and Complete Declaration (CAFCD).

In the wake of the 1991 Gulf war, Saddam directed PC-3 to restore Iraq's heavily damaged electrical grid and communications infrastructure, according to Al-Sa'di. Husayn Kamil abolished PC-3 in 1992 and sent most of its personnel to MIC companies and research centers, according to Huwaysh and Al-Sa'di.

Although a few returned to IAEC, all remained under Kamil's overall supervision. Saddam's guidance was to avoid dispersing former PC-3 scientists, but this was impossible because of MIC's structure, according to Huwaysh. In many companies, however, they retained a separate identity for several years and remained under a separate pay and promotion system until 2000, when Minister of Military Industrialization Huwaysh directed their full integration within MIC.

According to Huwaysh, a number of former PC-3 employees assigned to MIC were disenchanted because they were no longer doing nuclear research. Huwaysh noted that in MIC "most of my [morale] problems were PC-3 people." To ease these problems, Huwaysh said he sent some scientists to university faculties and moved others back to IAEC. A few former PC-3 scientists and engineers left Iraq for other countries, including Libya, which was heavily recruiting scientists through its embassy in Baghdad, much to Saddam's displeasure, according to Huwaysh. Early in 1998, Huwaysh said Saddam ordered him to take over what remained of Iraq's nuclear power generation program. According to Huwaysh, he strenuously disagreed, finally convincing Saddam that to do so would further isolate Iraq's nuclear scientists from their international counterparts, by creating the impression that Iraq's nuclear program was focused primarily on military applications. Saddam rescinded his order.

Renewed Interest in IAEC Activities

The following narrative is drawn almost entirely from custodial interviews of 'Abd al-Tawab Al-Mullah Huwaysh.

According to Huwaysh, in 1998, the directors general of the IAEC came to Dr. Humam, the former Director of the IAEC (then serving as Minister of Culture), to complain that the IAEC was suffering from low morale and productivity because of reduced budgets. Humam carried this message to Saddam Husayn.

In response, Saddam summoned his senior nuclear scientists, IAEC Director Dr. Fadil Muslim 'Abd al-Janabi, former head of PC-3 Dr. Jaf'ar Diya Jaf'ar, along with Humam and the directors general of the IAEC, to hear their concerns and seek their advice. Saddam offered them whatever they needed, Huwaysh said. Over the protests of the Minister of Finance, Saddam directed a large budget increase for the IAEC and increased IAEC salaries tenfold from 2001 to 2003 (plus liberal bonuses). Saddam also directed Fadil to keep nuclear scientists together, instituted new laws and regulations increasing privileges for IAEC scientists, and invested in numerous new projects, according to Huwaysh.

Beginning in late 2001, Saddam convened frequent (often weekly) meetings with the IAEC, including TV appearances to highlight IAEC achievements. Huwaysh did not recall much substance associated with these so-called "achievements." All this positive attention, particularly the increased salaries, attracted the attention of MIC's former PC-3 scientists and engineers, several of whom requested transfer to IAEC. Huwaysh, under pressure to let them go, said he countered with salary increases of his own, and most remained with MIC. Also, Saddam ordered certain projects in MIC to be transferred to IAEC, an arrangement Huwaysh said he got partially reversed after protesting directly to Saddam.

In late 2001 or early 2002, Fadil told Huwaysh he had an order from Saddam directing Huwaysh to help the IAEC purchase undisclosed specialized equipment. Huwaysh, a deputy prime minister, outranked Fadil and resisted taking orders from him. According to Huwaysh, he delayed acting on Fadil's order until after the next ministers' meeting where Saddam confirmed the order was valid. The IAEC, which had its own procurement system, required MIC's help to disguise the IAEC as the customer. Assisting Fadil was Dr. Khalid Ibrahim Sa'id, IAEC's senior nuclear scientist. Huwaysh was mildly surprised by Dr. Khalid's involvement because he was approaching mandatory retirement age, something Saddam rarely waived. Once assigned to this project, Huwaysh noted, Khalid's 64th birthday came and went and the subject of retirement never arose. Huwaysh presumed that Khalid's expertise was so critical to the project's success that normal rules did not apply.

To aid the transaction, Huwaysh said he introduced Drs. Fadil and Khalid to Munir Mamduh 'Awad Al-Qubaysi, general manager of Al Basha'ir Trading Company, a MIC front company specializing in covert procurement. Huwaysh said he emphasized to Fadil and Khalid the terms of the deal: MIC wanted no part of the project, required the IAEC make all commercial arrangements, and required hard currency from the IAEC for all payments. Munir Al-Qubaysi would be the only link between IAEC and MIC. There was no bidding process, according to Huwaysh. Selected companies responded to private tenders fronted by Al Basha'ir. Another source stated that at this same time, Drs. Fadil and Khalid sent an IAEC employee to MIC's Al Badr State Company to determine specifications for computer numerical control (CNC) machines. Supposedly, MIC's most advanced CNC machines were located at Al Badr. Other reporting suggested Al Badr may have assisted Al Basha'ir in preparing the contracts, possibly to further mask IAEC as the ultimate recipient of the machines. Once offers were received, Khalid made the final selection.

All paperwork went directly from Munir Al-Qubaysi to the IAEC, Huwaysh stated, except on one occasion when an administrator passed an invoice to Huwaysh by mistake. When Huwaysh realized it was most likely connected to the IAEC project, he signed it, reiterated that the transaction be completed in hard currency, and ordered it processed immediately. This was the only time he got a clue about what the IAEC was buying. The detailed invoice referred to a highly precise CNC machine, so precise that Huwaysh said he mentally questioned why such precision was necessary. Asked why, as the Minister of Military Industrialization, he did not follow-up on his reservations, Huwaysh said, "of course I wanted to know what was being bought, out of professional interest, but I knew better than to ask."

According to Huwaysh, Saddam wanted to apply the IAEC's scientific skills to support MIC activities, an idea Huwaysh believed had originated with Fadil. Huwaysh said that in 2002, based on this suggestion, Saddam ordered MIC and IAEC to work together on selected projects, with MIC outsourcing specific project elements to the IAEC. Huwaysh was unhappy with this arrangement, he asserted, and tried to limit it, doing just enough to satisfy Saddam. Huwaysh

assigned oversight of the MIC-IAEC relationship to Lt. Gen. Muzahim Sa'b Hasan Muhammad Al-Nasiri, his senior deputy at MIC. Day to day supervision resided with Maj. Gen. Dr. Hadi Tarish Zabun Muhammad Al-'Abbudi, MIC director general for research who also headed MIC's "special procurement office." As part of this arrangement, Huwaysh recalled IAEC personnel working on projects dealing with insulating materials, electronics, and possibly the Ababil missile, all of which were nonproscribed activities and unrelated to former nuclear programs.

Saddam Husayn's renewed interest from 2001 to 2003 in IAEC, and his emphasis on raising the profile of his nuclear scientists, rewarding their expertise, and purchasing specialized equipment made Huwaysh suspicious that Saddam might be attempting to restart a nuclear weapons program. At least one IAEC scientist shared Huwaysh's suspicions, according to reporting. In addition, Huwaysh did not believe that the new machine tools shop, then under construction at Tuwaitha, would be a MIC facility. Huwaysh could not comprehend why Saddam would take that chance because nuclear research and development was not something easily kept hidden. For the same reason, 'Amir Al-Sa'di dismissed Huwaysh's suspicions, arguing that even if sanctions were removed it was no longer feasible in 2001 for Saddam to rebuild Iraq's nuclear weapons program no matter how much Saddam might wish to do so.

Continuing the L-29 UAV Program

Huwaysh inherited the L-29 unmanned aerial vehicle (UAV) program along with Lt. Gen. Muzahim Sa'b Hasan Muhammad Al Nasiri when Saddam assigned Muzahim to be his deputy minister in MIC. Lt. Gen. Muzahim, a cousin of Saddam's half brothers, previously served as the Air Force and Air Defense commander and in other security-related positions working directly for Saddam.

In late 1997 or early 1998, Muzahim arranged a demonstration of the L-29 UAV for Huwaysh to help him decide whether to continue to fund the project.

Huwaysh learned previously that Husayn Kamil (others suggest it was 'Uday Saddam Husayn) began this program, originally using a MiG-21 fighter aircraft as the UAV, to develop an aerial platform to disseminate chemical or biological agents against invading military forces. In 1995, the L-29, a jet trainer with greater flying stability, was substituted for the MiG-21. However, according to Muzahim, the goal of the program now changed to battlefield aerial reconnaissance. Huwaysh found the L-29 UAV's range and maneuverability woefully inadequate for this mission and the aircraft extremely vulnerable to enemy air defenses. He believed the revised mission was misleading, since the Air Force, supposedly the intended user of the L-29 UAV, never showed much interest in the aircraft, and it was never tested with reconnaissance cameras. Huwaysh suspected that the L-29 UAV was being developed as an aerial dispenser for chemical or biological agents, although he had no direct supporting evidence. As 'Amir Al-Sa'di has pointed out, this conclusion presumes that CW or BW agents were available or forthcoming. Huwaysh wanted to cancel the project immediately, but relented when Muzahim told him the "order" to continue the project came from Saddam.

The program limped along for the next three years with no significant technical breakthroughs and several failures, in Huwaysh's words "consuming people, time, and money." After an L-29 UAV crash in October 2000, Huwaysh and the Minister of Defense convened an internal progress review for the program. Huwaysh wanted to cancel the program after listening to Dr. Ibrahim Husayn Isma'il Al-Jaburi, who was responsible for the project, point out numerous technical weaknesses, and the Air Force commander complain about losing too many L-29s. He felt he needed additional justification because of Saddam's direct interest in it. The crash of the third L-29 UAV in spring 2001 gave Huwaysh the impetus to immediately cancel the program. Fearful of Saddam's reaction, he did not inform him. Lt. Gen. Muzahim was angry about the cancellation, but Huwaysh told him "if the President asks, I will tell him why." Saddam never asked.

Building RPV-20s for the SSO

Following MIC's abandonment of the L-29 UAV project in early 2001, Ibrahim Husayn Isma'il Al Jaburi, Director General of Ibn-Firnas State Company, renewed his efforts on developing and producing an improved version of the Al Yamamah UAV. The resulting remotely piloted vehicle (RPV)-20 was a more effective and less costly aerial reconnaissance alternative to the L-29 UAV. In early 2003, a major from the Special Security Organization (SSO) contacted Ibrahim with a verbal order from Saddam Husayn to supply three RPV-20s to the SSO. Ibrahim referred the order to Huwaysh, who questioned the major in detail about the intended use of the UAVs. The major told him that they would be armed with a high explosive (TNT) warhead for use against "the enemy." Huwaysh explained to the major that the UAV, which had a total payload of 20 kg, including its guidance system, could carry at most 10 kg of high explosives as a replacement for its planned photo reconnaissance package. He believed this would be a poor strike weapon for the SSO. As an alternative, Huwaysh suggested the SSO consider either the Al Samud or Al Fat'h missiles, both with ranges exceeding that of the RPV-20 and carrying much larger warheads (350 kg of high explosives). The major insisted on the RPV-20s. When Huwaysh persisted in seeking more details about its intended mission, the major said Huwaysh had no need to know. Huwaysh responded that he could not support the request unless he had a written order from Saddam. By the next day the major provided one, but it did not specify how the RPV-20s were to be used.

Huwaysh notified Ibrahim to begin work on the modified RPV-20s but not to deliver them unless "I give you a direct order." In the meantime, the SSO major came to see Ibrahim every day asking when his RPV-20s would be ready. Twice Ibrahim called Huwaysh to tell him the RPV-20s were ready for delivery and twice Huwaysh refused to release them. He was concerned about the possibility of chemical or biological warheads being placed on the RPV-20s, even though, as 'Amir Al-Sa'di has contended, "I cannot see how [this] is even remotely possible." If the SSO did intend to put special warheads on the

RPV-20s, Huwaysh was concerned this activity would be discovered by the UN Monitoring, Verification and Inspection Commission (UNMOVIC), which was in Iraq conducting inspections, and it would implicate MIC. MIC never delivered any RPV-20s to the SSO. The war with the Coalition began before the Regime caught on to Huwaysh's stalling tactics.

Explaining the Ion Implantation Project

Huwaysh inherited the ion implantation project (IIP) in the same way as the L-29 UAV program: Senior Deputy Muzahim brought it with him when he came to MIC in 1997. At the time, Huwaysh was not interested in the project because he felt the associated research had no application to practical and achievable military-industrial requirements. According to Huwaysh, Muzahim told him the goal of the IIP was to develop a coating to improve the stealth characteristics of aircraft surfaces. Huwaysh believed this idea to be far-fetched, but he chose to reserve judgment for the time being. He did know that Iraq had no aircraft industry where this technology could be used, and none was planned.

Huwaysh said he visited the IIP for his first and only time in 1997. While Huwaysh admitted he did not feel qualified to judge the IIP's technical merit, he likewise was not satisfied that the alleged purpose of the project justified its existence. He considered the IIP more appropriate for university research than MIC research, but he did not have enough information to shut it down. Huwaysh said he knew canceling the IIP would not be easy because of Lt. Gen. Muzahim's personal interest in it and Muzahim's close association with Saddam. Therefore, Huwaysh continued to fund it from MIC accounts independent of any MIC company because it was inexpensive.

Until 1999, Dr. Mansur Sukr Fadhan managed the IIP under Lt. Gen. Muzahim's direct supervision, according to Huwaysh. Then, under unusual circumstances, Mansur left Iraq and later, according to the IIS, turned up in Iran. Even without Mansur, Muzahim was keen to continue IIP research, Huwaysh stated. In response, Huwaysh agreed to place the IIP in Al Tahaddi State Company, one of the companies Muzahim supervised,

and to assign it to Dr. Hikmat 'Arrak Hamid Thuwayni. Although Huwaysh was still not convinced the project had practical value, by 2002 his view of the research value of ion implantation changed. Huwaysh said he came to believe the IIP had some scientific merit, "without burdening us too much. Learning is important in [developing] new technology." Huwaysh accepted that that research in ion implantation and plasma streams could have important applications in other fields like cutting and welding stainless steel.

Asked specifically about applying ion implantation research skills to electro-magnetic isotope separation (EMIS) for uranium enrichment, Huwaysh said he never knew the two were related until after the Americans took him into custody and they explained it to him. One of his subordinates, however, provided a different view:

- A nuclear physicist claimed that at an unspecified date after March 1997 Huwaysh met with him in his laboratory at Al Tahaddi State Company and instructed him to pursue ion implantation as a way to preserve EMIS technology for a time when Iraq could reconstitute its nuclear program.
- The physicist also asserted that Saddam implicitly directed him to preserve nuclear-related research during a short conversation as Saddam presented him with an award for other work in March 2001. He expressed to Saddam the "pain in [my] heart" from the lack of appreciation for what he and other nuclear scientists achieved during their earlier nuclear research and development activities. The physicist said that Saddam then told him to continue with his projects, a move that he interpreted to mean keeping EMIS technology active. Saddam reportedly told him "I am the Godfather of the IAEC and I love the IAEC...I will make you happy."

Leading the National Mobilization Committee

In a ministers' meeting in late 1998, Saddam ordered Huwaysh and MIC to lead a national campaign to rehabilitate Iraq's electric power generation and distribution capability. Though wide in scope, Saddam's

decision was not strategic, it was a tactical response to a persistent and perplexing problem. For some time preceding Saddam's order, Iraq's electric power problems were a hot topic of discussion at weekly ministers' meetings. Under Saddam's questioning, Minister of Industry and Minerals 'Adnan 'Abd al-Majid, who supervised the Iraqi power grid, blamed the power outages and instability of the network on UN sanctions, and promised each week that things would soon improve. Instead, they got worse.

According to Huwaysh, 'Adnan's fellow ministers were increasingly unhappy with him both personally and professionally. No one, not even Saddam, was immune from power outages and nothing 'Adnan or his electricity advisor, then the former nuclear weapon program chief Dr. Ja'far Diya' Ja'far, was doing seemed to improve the situation. 'Amir Al-Sa'di maintained that Saddam may have been as much to blame for the continuation of these problems as his subordinates. According to 'Amir, Dr. Ja'far submitted a full report to Saddam explaining the nature of the problem and the long-term strategy required for its solution, but Saddam, always desirous of a quick fix, did not direct Ja'far to implement this strategy. Finally, Huwaysh told Saddam that he believed Iraq's electrical system was about to collapse, threatening not only Iraqi military-industrial production, but also the well-being of the entire economy, if nothing was done. Saddam, tired of hearing 'Adnan's excuses, handed the challenge of fixing it to Huwaysh.

Saddam gave Huwaysh full authority to requisition whatever resources he needed from the government and to involve the private sector. Huwaysh organized the National Mobilization Committee and began the restoration campaign on 1 January 1999. Besides MIC and the Ministry of Industry and Minerals (MIM), the committee included the Ministry of Oil (MoO), the Ministry of Higher Education and Scientific Research, and private sector partners, such as university professors. In addition, Saddam authorized the creation of an Electricity Commission, separate from MIM. The committee's goal was to reduce power outages countrywide and to provide more predictability when outages could not be avoided. First, the committee calculated national power requirements, estimated available resources and reserves, and assessed existing infrastructure. It then implemented a

comprehensive plan to shift available power reserves from one local grid to another on a predictable schedule, while using preplanned outages to repair and maintain the grids. Finally, the committee approved the purchase from China of new, more efficient power plants and directed the upgrade of the distribution system to increase power output and availability.

Specialist teams from across the Iraqi public and private sectors carried out the plan. These teams pooled their engineering, technical, and industrial skills to indigenously produce equipment and spare parts that Iraq had been unable to obtain in sufficient quantity because of UN sanctions and subsequently repaired and rebuilt much of the power grid. In its two and a half years of existence the National Mobilization Committee restored and stabilized Iraq's electrical network, not only reducing outages to a minimum (an average of two hours a night in Baghdad), but also absorbing a large increase in demand for electric power across Iraq. Having finished its work, on 1 July 2001 the committee handed over the network to the Iraqi Electric Commission.¹

'Amir Al-Sa'di suggested that the results achieved by the National Mobilization Committee were temporary and even more serious power outages returned shortly after the conclusion of Huwaysh's campaign. According to 'Amir, it was only when the government began to implement the long-term investment strategy that

¹ According to Huwaysh, sometime before the turnover of the network to the Electricity Commission, 'Amir Rashid proposed to Saddam (at a cabinet meeting) that he select Dr. Ja'far Diya' Ja'far as the new head of the Electric Commission, because of his work in restoring Iraq's electrical power grid following the Gulf war and his more recent experience as advisor on electricity to MIM. Saddam was about to approve Ja'far's nomination when Huwaysh strongly objected. Huwaysh told the ministers that controlling electricity is like controlling war and that Ja'far was not sufficiently courageous or technically capable to lead such a large and complicated network. Saddam was surprised and asked Huwaysh somewhat sarcastically, "He is good enough to make a nuclear bomb, but not good enough to run Iraq's electrical power system?" Huwaysh answered that Dr. Ja'far was a very good scientist but a weak administrator. While Ja'far was serving as the MIM electric power adviser, power plants ran continuously without regular maintenance being performed and spare parts were misused, according to Huwaysh. From 1991 to 1998, Huwaysh claimed, Iraq's power potential fell from 10,000 MW to 2,500 MW, and he considered Ja'far responsible. Many ministers were surprised that Huwaysh was so outspoken. Dr. Ja'far's nomination was put on hold and Saddam solicited new nominations. Dr. Ja'far's name was not among those nominated in the next round.

Dr. Ja'far had called for earlier, that the situation truly began to improve. The Iraqi Government hired the Italians to overhaul the Bayji power plant, the biggest in Iraq at 1200 MW, and the Russians to refurbish the 550 MW Nasiriyah plant. Both of these projects were completed before the war began in 2003 and other projects were also under way at that time. 'Amir argued that these successes vindicated Ja'far.

Preparing for a Massive Artillery Barrage on Israel

'Amir Al-Sa'di recalled that in early 1987, the Ministry of Defense (MoD) had planned to buy more artillery from foreign suppliers in preparation for a final push on Iran in the Iran-Iraq war. Husayn Kamil objected to the purchase and offered to supply all of MoD's needs for D-30, 122-mm, and 155-mm artillery. MoD countered that it needed more than the 100 guns per year that Saddam State Establishment was then capable of producing. Not to be outdone, Kamil boasted that he was ready to commit MIC to produce 500 artillery guns a year, including both D-30 and 155-mm. Before MoD could call Kamil's bluff, Saddam forced MoD to recalculate its D-30 requirements, which came to 100 guns for that year. As a result, MIC did not have to fulfill Kamil's promise, which would have been very difficult since no production line existed at that time for 155-mm guns. MIC's supposed capacity to produce 500 artillery guns annually must have remained in Saddam's mind, because in late 1999, Saddam ordered the indigenous production of 500 artillery pieces (155-mm and 210-mm) a year. Saddam's goal was to deploy 2,000 artillery pieces in Jordan and 1,000 pieces in Syria to launch a massive artillery barrage on the Israelis to liberate Palestine. However, Saddam did not explain how he would get permission from Jordan and Syria for such a deployment. Upon receiving the order, Huwaysh told Saddam it was at odds with his existing artillery production plan already worked out with the MoD. That plan called for only 25 new artillery pieces a year. It would take time to reallocate resources, reconfigure factories, startup a new production line, as well as find potential foreign buyers for artillery pieces that could not, over time, be absorbed

by the Iraqi military. The whole process would take MIC at least three years—it could produce 100 new artillery pieces the first year, 200 the second year, and 500 by the end of the third year. Saddam accepted this explanation and told Huwaysh to proceed as he proposed.

MIC produced 100 artillery pieces by the end of 2001, 200 by the end of 2002, and was on track to meet its quota of 500 in 2003 when the war intervened. Saddam Husayn's first public threat to use them occurred in January 2001 during a visit to Iraq by Palestine Liberation Organization Political Development head Faruq Qaddumi. On Baghdad TV, Saddam shared his vision of Iraqi forces firing at Israel from Jordan, Syria, Lebanon, and Egypt with long-range artillery. "When artillery guns begin to fire their shells...[the Israeli immigrant] settler [will] pack up and leave... Israel cannot stand in the face of continuous artillery shelling for six months." Although this was a novel approach to liberating Palestine it was not a spur of the moment threat. Saddam's strategy and his orders to produce weapons that would make his threat appear credible also had other motives, according to Huwaysh. Iraqi artillery posed little practical threat to Israel; however it gave Saddam great propaganda value among the Palestinians while improving Iraq's capabilities against its real threat—superior Iranian ground forces.

Restarting a Chemical or Biological Weapons Program

Huwaysh recalled that Saddam approached him immediately following a ministers' meeting to ask how long it would take to restart production of chemical agents (Huwaysh thought it was in 1999, but he also indicated this conversation may have occurred in 2001). After checking with his scientists, Huwaysh told Saddam he probably could begin production of Mustard in six months, but other more complex agents would take much longer. Production of VX or sarin, for example, would require obtaining specialized equipment, reestablishing laboratories, building new factories, and reassembling chemical weapons team.

Saddam did not raise this issue again for another

year or more. In 2001, Saddam approached him in a one-on-one conversation after a ministers' meeting and asked, "Do you have any programs going on that I don't know about?" Clearly was implying chemical or biological weapons programs. Huwaysh, answered no, absolutely not. He assumed that Saddam was testing him, so Huwaysh added that since these programs were prohibited by the United Nations, he could not pursue them unless Saddam ordered it. Huwaysh said Saddam seemed satisfied, asked no further questions, and directed no follow-up actions. This incident was perplexing to Huwaysh, because he wondered why Saddam would ask him this question. While Huwaysh had no evidence of the existence of WMD programs in Iraq, if such work were being done, then the SSO's ability to compartment projects and assign individuals to do special work made it the most likely place for WMD activity. Disagreeing with Huwaysh's speculation, 'Amir Al-Sa'di, noted that it showed Huwaysh's ignorance about what it takes to produce viable and significant quantities of CW and BW agents and to weaponize them.

Asked about the context of Saddam's question on restarting chemical weapon production, Huwaysh could point to no specific internal, regional, or international events that might have prompted it, nor did he have any specific warning from Saddam that such a request might be coming. Saddam had become increasingly paranoid about the impact of sanctions on Iraq's conventional military capability. Specifically, Saddam feared the Iranians, who constantly were interfering in the south. Saddam anticipated that Iraq might have to fight another war with them. According to Huwaysh, "this was not a stable situation; every day was a problem." Saddam knew Iraq's armed forces were not capable of defeating Iran in another war and was looking for a quick alternative to stem an invasion, if it came. While Saddam mouthed the conventional anti-Israeli rhetoric, he was convinced Iran was the real threat.

'Amir Al-Sa'di agreed that Saddam perceived Iran as Iraq's primary threat, however 'Amir is convinced that Saddam did not fail to comprehend the consequences if he used CW or BW against Iran. As 'Amir pointed out, Iran suffered dearly from Iraq's use of CW and missiles during the Iran-Iraq war. In the succeeding years, Iraq's military capabilities have degraded, crip-

pled by UN sanctions. Iran, during the same period, has been rebuilding its military arsenal, including covert production of CW and BW, unconstrained by sanctions and enjoying good relations with its technology suppliers. According to 'Amir, "does any sane leader or military commander think that Iran will not retaliate in kind if Iraq used such weapons, even on a limited scale, against them? I don't think Saddam is that mad. If Saddam was that mad or irrational, why did he not use them when he had them in 1991 against the Coalition? Or, if he had any hidden WMD, as suspected by the new Coalition and perhaps some Iraqis like Huwaysh, during the second Gulf war when Baghdad was about to fall?"

In early 2002, Qusay asked Huwaysh to compile a list of Iraqi BW experts that Qusay intended to pass to Syria. Huwaysh delivered this request to NMD Director Husam Muhammad Amin Al Yasin, who worked for Huwaysh, and instructed him to retain the list, when completed, unless Qusay requested it. Huwaysh told Husam not to include Dr. Rihab Rashid Taha Najm Al 'Azzawi, at the request of her husband Minister of Oil 'Amir Rashid. Huwaysh did not know if Husam ever passed the list to Qusay; however, Huwaysh believed no Iraqi scientists were sent to Syria. 'Amir Al-Sa'di also believed that no Iraqi scientists worked with the Syrians on BW or other WMD projects. According to 'Amir, the Syrians, fearing discovery by Israeli intelligence, would never risk such collaboration with the Iraqis. As for Huwaysh's claim that he did not know if Husam ever passed the list he compiled to Qusay, 'Amir believed it was inconceivable that Husam would not have informed his boss, Huwaysh, on such a sensitive issue.

Supporting Saddam and the Air Defense Committee

After 1998, Saddam showed increased personal interest in air defense issues, including almost daily television appearances with voice-over commentaries. Desperate to shoot down a Coalition aircraft for both national security and propaganda reasons, Saddam convened an interagency committee in late 2001 to overhaul and reconfigure Iraqi air defenses. This is the only time Huwaysh recalled Saddam directing what was essentially a MIC research and develop-

ment effort. While Saddam appointed Huwaysh as chairman of this committee for day-to-day business, Saddam himself presided over monthly meetings and its members reported directly to him. The members included the Minister of Defense and members of his staff, the Minister of Industry and Minerals, the Air Defense Commander, the Director of the IAEC, and all the directors general in MIC headquarters. Saddam's sons, Qusay and 'Uday, also attended the meetings. The initial term of the committee was six months, but Saddam extended it twice. Main topics of discussion included technical development, logistical support, and protection measures for the air defense missile forces.

Saddam sacked the Air Defense Commander, Staff Lt. Gen. Shahin Yasin Muhammad, immediately after the first meeting because all Volga (SA-2) missiles were nonfunctional—deployed for "decoration, not for war." As an excuse for the Air Defense Command's deficiencies, Shahin complained that MIC had not adequately supported him. Huwaysh vigorously defended MIC, explaining to Saddam that Iraq's air defenses failed because Shahin tried to do his own research and development, independent of MIC, instead of concentrating on operational matters. Saddam appointed Staff Lt. Gen. Muzahim Sa'b, Huwaysh's senior deputy who previously served as Air Force Commander, to replace Shahin.

Muzahim fared little better. Available air defense weapons were obsolete and poorly maintained, and morale was low among air defense personnel. Rapid improvement in performance was nearly impossible. Still Saddam sought a "silver bullet" that would bring him success against Coalition aircraft patrolling the "no-fly zones" in southern and northern Iraq. The Air Defense Committee proposed many technical improvements for Iraqi air defense systems, but the Air Defense Command was not able to apply them, because its personnel were poorly trained. Despite this, Iraqi air defenses made some gains, using new techniques to mislead enemy antiradiation missiles and to interrupt laser guidance systems. Others have argued that Saddam's focus on air defense was not only a failure, but encouraged schemes that were dangerous as well as expensive.

Providing ‘Another Explosive Material’ for Missile Warheads

In 2000 Saddam asked Huwaysh, “Do you have another explosive material for missile warheads?” Huwaysh assumed he was asking about alternatives to HMX, TNT, or RDX conventional explosives. MIC was working on a new explosive at the time designated C-20 that was similar to C-4. MIC engineers had not perfected the stabilizing agent for C-20, however, so it was not ready for weaponization. Huwaysh briefed Saddam on this situation, but Saddam said nothing and the issue did not come up again. At the time, Huwaysh did not interpret Saddam’s query to be about a WMD warhead, but based in part on comments Saddam made in the late 1990s Huwaysh later speculated that it may have been. ‘Amir Al-Sa’di contended that if Saddam’s query was truly about the availability of a WMD warhead, and Huwaysh did not understand that, Saddam would have replaced Huwaysh immediately. Instead Saddam promoted him to Deputy Prime Minister.

Designing a Sanctions-Busting Missile

According to Huwaysh, Saddam asked him—possibly in the spring of 2002—if MIC could produce a missile with a range of 650 to 750 km in six months and added that he had decided not to allow UN inspectors to return. Al Fat’h and Al Samud II missiles, nominally restricted in range to 150 km, were now in production, and Saddam was very pleased at the promise his missile programs were showing. Saddam said he needed a minimum of 650 km to threaten targets in Iran and Israel. He did not mention other targets. Huwaysh believed that Saddam thought this was the ideal time to “jump to a new missile” with sufficient range to deter regional adversaries. Besides being a violation of UN restrictions, such an effort would take three to five years and required flight-testing, which would be detected by US satellites, Huwaysh told Saddam. Saddam was disappointed with this answer, but ordered MIC to begin design work and to report back in six months. To avoid disclosure of this program, Saddam ordered that no written documentation and no phone calls were allowed. All associated discussions were to be conducted face to face.

‘Amir Al-Sa’di questioned whether the orders for secrecy associated with Saddam’s request came from Saddam or from Huwaysh. According to Al-Sa’di, Saddam openly ordered government officials to defend Iraq’s missile programs, arguing that they should be disassociated from WMD, because they were a legitimate aspect of Iraqi self-defense. Saddam anticipated objections from the UN Security Council on this matter, but believed that the Security Council’s only recourse would be to continue sanctions. By early 2002, Saddam was convinced support for sanctions was eroding and they would soon disappear irrespective of what happened with Iraqi missile programs.

In response to Saddam’s order, Huwaysh commissioned design studies building on available missile programs. One was based on the solid-propellant Al Fat’h, designed by ‘Abd al-Baqi Rashid Shia’ Al Ta’i, at Al Rashid State Company. The other centered on the liquid-propellant Al Samud II, designed by Dr. Muzhir [Modher] Sadiq Saba’ Khamis Al Tamimi at Al Karama State Company.

Within a month, ‘Abd al-Baqi encountered a serious setback with the solid-propellant design. While sufficient indigenously produced ingredients were available to make the solid propellant, MIC had no facilities large enough to do continuous casting of the larger rocket motor required for the extended range. Work on the liquid-propellant alternative under Muzhir continued, based on two Volga engines (the same engine used by the Al Samud II) configured side-by-side. At the end of six months, Muzhir’s team completed a preliminary design, but its maximum theoretical range was only 550 km. Muzhir told Huwaysh the design could be expanded to accommodate as many as five clustered engines to gain additional range, but provided him no design drawings for that alternative.

In late fall of 2002, Huwaysh briefed the 550-km design results to Saddam. When Saddam learned that the missile’s projected range did not exceed 550 km, he left the room without comment and the briefing abruptly ended. Although Saddam saw Huwaysh on a weekly basis from then until March 2003, Saddam never raised this issue again. ‘Amir Al-Sa’di noted that Saddam had clearly given up on Huwaysh at this

point, but it was too late to do anything about it. In the project's aftermath, Huwaysh said he required Muzhir to bring him all the documents relating to the missile design. Huwaysh took the documents to his house and burned them on 17 March 2003 to avoid their confiscation.

Several credible former Iraqi officials and ISG-recovered documents suggest that work on a ballistic missile designed to exceed UN restrictions began much earlier than the above account provided by Huwaysh and that he directed this work to be done.²

By his own admission, one of Huwaysh's highest priorities when he became Director of MIC in March 1997 was to develop a workable design for a new surface-to-surface missile. Repeated failures to do so was one reason Saddam fired Huwaysh's predecessor.

- Maj. Gen. Ra'd Isma'il Jamil Muhammad Al 'Azawi, former Director General of Al Karama State Company, said that in 1987 Huwaysh requested him to convert a Volga (SA-2) air defense missile into a surface-to-surface missile. After field-testing, supervised by two Iraqi general officers, Ra'ad speculated the missile had an accurate range of at least 250 km. Maj. Gen. Ra'd said Huwaysh told him to stop work immediately and destroy all documentary evidence of the tests.
- 'Amir Al Sa'di noted that Ra'd had first attempted to convert a Volga missile, as described above, in 1988 and 1989, but failed to achieve satisfactory results and eventually abandoned the work. Al-Sa'di was surprised that Ra'd would make another attempt after what Ra'd had learned the first time about the difficulty of controlling the Volga when converted to a surface-to-surface missile. According to Al-Sa'di, since the Volga used aerodynamic vanes to control its direction of flight, it had to remain in the atmosphere during its boost phase. This required the missile to fly a flattened trajectory until engine cut-off resulting in shorter range (no more than 130 to 140 km) and dubious accuracy.

² ISG recovered drawings of long-range missiles based on clustered SA-2 engines. The drawings were dated August 2000, indicating more reliably than debriefings that the design work began earlier than Huwaysh's assertion. The work may have begun or was completed in August 2000, consistent with Muzhir's claims.

In Al Sa'di's opinion, Huwaysh stopped the work a second time because of pressure from the NMD or because someone explained to Huwaysh that the proposed conversion was fruitless.

- In mid-1998, Huwaysh ordered 'Abd al-Baqi to develop a solid-propellant missile capable of a range of 1,000 to 1,200 km. The source speculated Huwaysh's order came directly from Saddam, who wanted to use this missile with a chemical warhead. The initial testing of missile components began in mid-2000, with a test of a complete missile in late 2001. MIC's intended use of the two 300-gallon mixers that it began repairing in 2000 was to make composite propellants for this missile, not for the Al Fat'h, as Huwaysh maintained. The mixers were originally made inoperable by UNSCOM inspectors in 1992.
- 'Amir Al-Sa'di believed the above account is highly unlikely. 'Abd al-Baqi, although an expert in propellants, lacked experience in overall missile design. If Huwaysh did order 'Abd al-Baqi to work on an extended range missile in 1998, 'Amir maintained that the logical procedure would have been to design a scaled-down configuration for the rocket motor and then carry out static tests, a process within 'Abd al-Baqi's capability at Al Rashid State Company. The final configuration of an extended range missile (1,000 to 1,200 km), however, would have required continuous casting of the composite grain, solid-propellant rocket motor, a process not possible until the 300-gallon mixers were repaired in 2002. It would have also required flexible nozzle technology for thrust directional control, something the Iraqis had never before attempted. According to 'Amir, the above scenario, if true, may explain Huwaysh's frantic efforts to repair the 300-gallon mixers beginning in 2000 and his strong resistance to declaring or dismantling them when Saddam allowed UN inspectors to return to Iraq in late 2002.
- Muzhir disputed Huwaysh's timeline in his account of the design of the 650 to 750-km missile. Muzhir alleged that in 2000 Huwaysh ordered two computer designs be done to extend the range of the Al Samud missile, one for 500 km and the other for

1,000 km. When Muzhir requested written authority from Saddam to proceed on a project that violated UN missile range restrictions, Huwaysh refused and became angry.

- In late 2000, Muzhir claimed he gave a report to Huwaysh detailing results of a feasibility study for missiles with 500- and 1,000-km ranges. The study was based on clustered Volga engines, two for 500 km and five for 1,000 km. This work was put aside to focus on the Al Samud project until the first quarter of 2002.
- In an attempt to explain the discrepancy between Muzhir's recollections of missile development timelines and his own, Huwaysh stated that a young engineer named 'Uday from Al Karama State Company visited him in 2001 after complaining in writing that Muzhir had "stolen" his design for a long-range missile. Earlier, the engineer submitted his design, based on clustered Volga engines, to Muzhir. 'Uday was proud of his work and brought sketches to show Huwaysh. He was surprised when Huwaysh reprimanded him and then gave him an administrative punishment for proposing a missile design that exceeded UN restrictions. Huwaysh insisted that Saddam was also upset when Huwaysh informed him of 'Uday's work. Maybe Muzhir's memory of 'Uday's design, Huwaysh mused, had confused Muzhir about the sequence of events in the timeline.
- 'Amir Al-Sa'di suggested that Dr. Muzhir and other Iraqi engineers thoroughly investigated the clustering of liquid-propellant engines in 1988 and 1989. An example is the clustering of five Scud engines in the Al 'Abid booster that Iraq tested successfully in November 1989. Clustering Volga engines would be simply a scaled-down version of that earlier enterprise. 'Amir said it was very unlikely, based on Dr. Muzhir's familiarity with this research, that Muzhir would need to "steal" 'Uday's alleged designs. 'Amir believed that Muzhir may have informed Huwaysh about the potential for increased range offered by clustering, which might explain Huwaysh's reaction to 'Uday's work.

Supporting Saddam's Other Pet Projects

Huwaysh cited several examples of military technology projects that Saddam sent to him from government agencies outside MIC. Often their proponents exaggerated these projects' technical merit to attract Saddam's attention and to obtain independent funding. Other times individual scientists or university professors would approach Saddam seeking sponsorship for their projects. Saddam, desperate to find and exploit any potential advantage, would direct the projects to MIC for further research and development. (Two groups that were key proprietors of these projects, the 404 Group and the 28 Nisan Group, are outlined in greater detail in Annex D: Iraq's Military Industrialization Facilities.) Huwaysh considered most of these projects to be scams. To his chagrin, once projects got Saddam's backing, Huwaysh had great difficulty ending them, even if their technical basis was clearly erroneous. The process constantly played havoc with MIC planning.

Others argued that Huwaysh and other senior Iraqi officials were at the heart of an institutional deception of Saddam Husayn that convinced him he had a much stronger weapons arsenal than actually existed. Allegedly out of fear of Saddam's reaction, Huwaysh and his subordinates at MIC faked plans and designs to show progress in programs that did not exist. Saddam was not well informed enough to catch them in their lies and never sought a demonstration of the newly developed weapons. In the process, MIC officials squandered or embezzled huge amounts of Iraqi money, and Iraq was left unprotected and unprepared for war.

- For example, in 2000 Saddam ordered Huwaysh and Muzhir Sadiq Saba' to build a cruise missile with a range of 2,500 km. They knew it could not be done, but to satisfy Saddam they created a complete plan on paper and briefed him on it. Three months later when Saddam sought an update on the plan, Huwaysh indicated it was on schedule. However, when Saddam pursued the matter again, he was told UN sanctions were limiting Iraq's ability to fully develop, test, and complete the missile system. Saddam was upset with this answer, but did not challenge it.

Fadil Salfij Mihaymid Al 'Azzawi, a former ambassador and Deputy Director of the IIS, considered Huwaysh to be "stupid and a liar." Fadil said that Huwaysh was very influential in the Iraqi Regime and he convinced Saddam that Iraq had weapons capabilities that, in fact, it did not possess. According to Fadil, "if Iraq had these weapons, it would have used them." 'Amir Al-Sa'di thought that Fadil's comments were prompted by Saddam's apparent confidence in the face of real and serious threats, a reaction from Saddam that many people found perplexing. Others believed that Saddam was playing a political game of brinkmanship, and all his posturing was for local and regional consumption.

Although 'Amir Al-Sa'di agreed that the public perception of MIC had suffered by 2003, he maintained that Saddam was not as easily deceived as some of the sources above claim, unless it suited his larger scheme. For example, Al-Sa'di cited Saddam's actions during the 1987 to 1988 development, testing, and first use of the extended range Al Husayn missile. Saddam sent his own private team of photographers to tape the tests and provide the videos to him separately from normal MIC reporting channels. In addition, he had "eyes" inserted in the development teams, who reported independently of normal channels. In February 1988, after Baghdad was hit yet again by Iranian Scuds, Saddam decided to retaliate using Al Husayn missiles that MIC claimed could now reach Tehran. Prior to their use, Saddam brought his Al Husayn development team together in front of the Regime leadership and announced "these young men from MIC assured [me] that they are ready to carry out [my] warning to Iran." According to Al-Sa'di, this was Saddam's way of telling all present that he was relying on what MIC had told him and if the missiles failed to hit Tehran, then everyone would know who was to blame.

Al Quds Project

During 1999, Saddam prompted MIC to restart its small UAV development program, which lapsed when Brig. Dr. Imad 'Abd al-Latif 'Abd al-Ridha retired from the Air Force in 1997. Saddam reportedly wanted a UAV program on par with the United States,

although 'Amir Al-Sa'di commented that making such a comparison was not typical of Saddam. In late 1999, Imad approached Hadi Tarish Zabun, MIC Director General for Research and a personal friend, to seek MIC funding for his new UAV project, Al Quds (Jerusalem). Imad did not, however, want to be under MIC control. Despite Saddam's interest, Huwaysh was skeptical about supporting Al Quds, because he did not want it to draw resources from MIC's existing program to upgrade the Al Yamamah UAV.

With Hadi's endorsement and his promise to oversee Imad's work, in January 2000 Huwaysh allowed the project to proceed, funded by the Ibn-Firnas State Company. MIC did not specify a mission for Al Quds and Imad did not propose one. During the next two years, Imad produced nine prototypes, eight with a payload capacity of 15 kg, less than that of the RPV-20. ISG does not know the payload capacity of the ninth prototype. While the end user for Al Quds was not specified, recovered Iraqi documents show a contractual agreement from December 2000 between MIC, the Iraqi Air Force, and Fedayeen Saddam for two probable Al Quds prototypes.

In May 2002, MIC levied a new flight duration requirement of four hours for Al Quds. Extrapolating Al Quds' nominal airspeed of 125 km/hr over a four-hour period gave it a maximum flight distance of 500 km, well in excess of the maximum range allowed under UN restrictions. 'Amir Al-Sa'di claimed that Al Quds never actually violated UN restrictions for UAVs. He and NMD Director Husam Amin, after requesting and receiving a MIC report on Al Quds, determined that the project did not involve any UN-proscribed activity. 'Amir and Husam forwarded the report to UNMOVIC for further discussion and the matter was still awaiting resolution when the war began.

In August 2002, Huwaysh's senior deputy, Lt. Gen. Muzahim, told Imad that MIC did not need two separate entities producing small UAVs. Muzahim directed Imad to increase the payload of Al Quds to 100 kg, probably to accommodate an electronic warfare package then under development by Al Milad Electronic Warfare Center or Al Battani State Company.

According to another source, Imad stated Al Quds was designed to be a flying bomb. Four Al Quds, each to be loaded with 5 kg of C-4 explosives, were to go to one of Saddam's friends in Jordan, a former member of Hamas, who intended to use them against Israel's Prime Minister Ariel Sharon when he visited the Wailing Wall in Jerusalem at some unspecified time in the future. Huwaysh contends this account is illusion, not reality, and the information is incorrect.

In March 2003, Imad demonstrated the latest Al Quds prototype for Muzahim, but it crashed. Imad begged to be given another chance in two weeks; Huwaysh told him to take a month. Despite giving Imad a reprieve, Huwaysh was disappointed with Al Quds' progress. After three years of development, the Al Quds project failed to produce a UAV capable of fully autonomous flight. Before the month expired, Iraq was at war with the Coalition and work on the project ended.

'Usama the Computer Hacker

In late 2002, Saddam directed Huwaysh to "provide equipment and funding, whatever is needed" for a high priority project conducted by a young Iraqi male, with the cover name "Usama." According to Huwaysh, 'Usama was the nephew of Saddam's second wife, had a master's degree in computer science, and was an accomplished computer hacker.

While Saddam assigned 'Usama to MIC, he instructed 'Usama to work alone and report directly to him. Saddam challenged Huwaysh to test 'Usama's hacking skills against the Ministry of Foreign Affairs encrypted telephone system developed and produced by MIC's Al Salam State Company. Huwaysh felt certain this system was secure, so he was very surprised when 'Usama appeared to have deciphered messages from it. 'Usama's success caused Saddam to rebuke Al Salam for creating supposedly secure communication devices that were easily compromised. To further test 'Usama's skills, Huwaysh assigned him to gain access to the computer software in the Iraqi Air Force's F-1 aircraft simulator. The simulator, produced by the French, was malfunctioning because of glitches in its proprietary software and UN sanctions

made arranging for repairs difficult. Sophisticated protection controls made gaining access to the simulation software seemingly impossible without French assistance. Again, to Huwaysh's surprise, 'Usama was able to penetrate the simulator system's firewall. Once inside, MIC technicians were able to make the necessary repairs.

Allegedly 'Usama could hack into US military satellites by attacking their computer systems with a virus. When the system responded to destroy the virus, it transmitted a code that 'Usama captured. This code gave him sensitive access to the entire US military satellite system including overhead imagery. According to Huwaysh, he and Muzahim Sa'b visited 'Usama in his office and 'Usama displayed on his computer screen real-time, overhead video supposedly of military activities on US installations in Turkey, Kuwait, and Qatar. Huwaysh acknowledged, however, that he could not verify these locations from the scenes depicted. 'Usama also demonstrated his ability to intercept communications. Huwaysh recalled that he heard voices within the communications, but he could not understand what was being said. 'Usama claimed he had eavesdropped on Iraqi and Coalition communications systems, including decoding encrypted Iraqi Government telephone calls as well as unencrypted communications between the Pentagon and forward-deployed US forces.

'Usama said his goal was twofold: (1) to jam signals from US military satellites, and defeat US and Coalition guidance systems dependent on those signals; and (2) to use a virus to alter the computer memory of the US Airborne Warning and Control System to disrupt command and control of Coalition tactical aircraft. Huwaysh believed the primary advantage 'Usama offered was advance warning of Coalition attack. Just prior to the start of Coalition operations, Saddam ordered MIC to equip a top-secret facility according to 'Usama's specifications. Included were computers, digital transceivers, and satellite dish antennas. As a venue, Huwaysh gave 'Usama the building which contained his alternate MIC headquarters. After Coalition operations began, Huwaysh went by the facility to see it in operation. Though 'Usama failed to provide warning of the Coalition attack, Huwaysh wanted to see what progress he was making on the other proposed tasks. 'Usama was not

there, and Huwaysh never saw him again. According to Huwaysh, the equipment remained but it was never used.

Separating fact from fiction regarding 'Usama's hacking skills is tricky. Huwaysh claimed firsthand knowledge of 'Usama's ability to penetrate the F-1 simulator's sophisticated firewall and to decode encrypted Iraqi telephone calls. 'Usama's alleged ability to download classified satellite imagery, however, is suspect. The streaming video that Huwaysh described seeing on 'Usama's computer screen may have come from a satellite down-link, but it was not satellite imagery, which is never provided in that format. Later analysis confirmed that 'Usama's secret facility, located on the Baghdad Aerospace Research Center compound (Al Battani State Company), was a logical place for satellite intercept activities because of its access to satellite-tracking data from the center. Obtaining imagery from US intelligence satellites would have required 'Usama to hack into secure US networks without the intrusion being detected and then to decode the signals' sophisticated encryption. No such compromise has been verified. More likely, 'Usama located and downloaded the unencrypted satellite feed from US military UAVs and possibly used the Internet to download commercial imagery. Both are feasible explanations of how he might have obtained products to support his story and impress Saddam.

Independent Entrepreneurs

Some projects that attracted Saddam's attention came from the private sector, often through members of Saddam's family or through academics doing research independent of MIC. University professors were not well paid, so if they could convince Saddam to adopt a new technical scheme, especially one enhancing air defense or military capability, the originator would be rewarded with money or a car. Faced with desperate economic circumstances these entrepreneurs often exaggerated their claims to win Saddam's approval.

One academic, Dr. Ahmad Husayn Khudayr, proposed to create an air defense missile tracking and targeting system using sound waves (Dr. Ahmad Husayn Khudayr is not the same individual as Ahmad Husayn Khudayr, Chairman of the Presidential Diwan). He wanted 700 million Iraqi dinar to develop it. Saddam referred the professor to MIC to obtain funding. Huwaysh refused, convinced the project was not technically feasible and a likely scam. Because the project had Saddam's support, the professor sought his intervention to force Huwaysh to fund it. Upon receiving a letter from Saddam, asking why he had refused, Huwaysh explained the project's deficiencies. Saddam persisted and Huwaysh eventually arranged a contract between the Air Defense Command and the Diwan, with the Diwan paying for the professor's project.

Another engineer, 'Abd al-Latif Al-Ani, submitted a plan for a "centrifugal force gun" and persuaded Saddam to sponsor it. Huwaysh thought it was a totally spurious design and refused to provide MIC funding for it. Once again Saddam protested Huwaysh's rebuff, accusing him of being worried about competition. On the contrary, said Huwaysh, "I have to decide what to fund and what not to fund based on whether it is logical or not logical. If I fund something that is not logical, I am cheating the government and I'm cheating you (Saddam)." According to 'Amir Al-Sa'di, 'Abd al-Latif eventually got funding for his project from the Presidential Diwan and produced what he called a "functional model." Although his model was successful, 'Abd al-Latif claimed MIC refused, because of jealousy, to provide the assistance required to build a prototype. Unlike Huwaysh, 'Amir believed the concept, with further refinements and validation, was feasible. If the design was workable, 'Amir said, a "centrifugal force gun" could be cheaper than a Gatling gun (with similar muzzle velocity), although not as compact and mobile. 'Amir had planned to go see 'Abd al-Latif's model, but never found time during the five months before the war began.

**Annex D
Iraq's Military Industrialization
Facilities**

MIC Subordinate Companies and Facilities in Early 2003

R&D, Design, and Construction Companies		
Company Name and Subordinate Elements	Primary Activities	Location
Al Milad State Company	Military electronics R&D—radar, communications, command and control systems	Al Mahmudiyah, Baghdad
Al Quds State Company	Ammunition and mechanical military R&D—artillery, armor, camouflage	Al Iskandariyah
Al Battani State Company	Microwave and space research, remote sensing	Al Jadriyah, Baghdad
Al Khawarizmi State Company Farabi Computer Center	Computer programming, training, and services Administrative, financial, and planning software; MIC data processing	Al Jadriyah, Baghdad Al Kazimiyah, Baghdad (Kadhimiya)
Al Rayah State Company	Measurement, metallurgy, polymers research, catalysts	South Taji industrial area
Ibn-Sina State Company	Chemical, silicon, and explosive materials research, missile propellant R&D, pilot-scale production	Al Tarmiyah
Al Basil State Company Nahrawan plant	Petroleum, petrochemical, missile propellant research Pilot-scale chemical production	Al Jadriyah, Baghdad Nahrawan section of Baghdad
Al Kindi State Company	Electronic, mechanical, munitions, chemical, and communications research; rail and highway signals and telephone exchange manufacturing, liquid-propellant production	Mosul
Al Razi State Company	Military and industrial laser research	Al Kazimiyah, Baghdad
Al Fat'h State Company	Solid-propellant missile research	Al Amiriyah, Baghdad
Al Faw State Company Southern Regional Office Northern Regional Office Central Regional Office Baghdad Regional Office	Industrial plant construction, other large construction projects	Hay al-Rabi, Al 'Azimiyah, Baghdad Basrah Mosul Al Yusifiyah Al Tajiyat, Baghdad
Sa'd State Company Ibn-Yunis Center Al Zahrawi Center Al Khazin Center Al Waddah Center	Facility design and project management Mechanical Engineering Design Center Chemical Engineering Design Center Electrical and Electronic Engineering Design Center Civil engineering Design and Construction Center, utilities installations	Near Rashid Hotel, Baghdad 'Uwayrij, Baghdad Sa'd headquarters Al Za'faraniyah Sa'd headquarters
Al Majd State Company	Production technology technical design	Al Jadriyah, Baghdad

General Purpose Manufacturing and Metal Working Establishments		
Company Name and Subordinate Elements	Primary activities	Location
Al Nida' State Company	Molds and other tooling, specialized metal products, precision machining	Al Za' faraniyah
Badr State Company	Molds and other production tooling, tungsten carbide tools, specialty manufacturing	Al Yusifiyah, adjacent to Umm-al-Ma'arik State Company
Umm-al-Ma'arik State Company	Rocket motor cases, heavy machining, specialty welding	Al Yusifiyah, adjacent to Badr State Company
Al Nasr Al 'Azim State Company (formerly the State Establishment for Heavy Engineering Equipment [SEHEE])	Petroleum, petrochemical, and chemical equipment; tanks, reactors, heat exchangers, boilers, boats; transferred from Ministry of Oil to MIC in 1998	Al Dawrah, Baghdad
Ibn-Majid State Company	Same range of products as Al Nasr Al 'Azim but serving the southern Iraq market; began production in 1999	Basrah/Az Zubayr
Al Samud State Company	Specialty steel products, artillery tube rough shapes, heavy alloys, forgings, electric poles/towers, mobile roof cranes, galvanized products; moved from MIM to MIC in 2001	Taji
Ibn-al-Walid State Company	Tank and armored vehicle manufacturing, refurbishment	Abu Ghurayb
Al Radwan State Company	Artillery gun carriages; tanks and vessels; parts and equipment for oil, petrochemical, and chemical industries	Khan Dari
Al 'Ubur State Company	T-72 engine block castings, aluminum and magnesium casting, pumps, and precision casting	Khan Dari

Missile and UAV Manufacturing Facilities		
Company Name and Subordinate Elements	Primary Activities	Location
Al Karama State Company Waziriyah site (Karama plant) Kazimiyah site (Ibn-al-Haytham) Al Samud Factory Al Fat'h Factory Al Quds Factory Al-Rafah test site	Liquid-propellant missiles	HQ in Al Waziriyah, Baghdad Al Waziriyah, Baghdad Al Kazimiyah, Baghdad Abu Ghurayb Al Tajyat, Baghdad Al Tajyat, Baghdad Al-'Amiriyah, Al Anbar
Al Rashid State Company Al Athir site Al Mamun Factory Al Mu'tasim Factory Dhu-al-Fiqar Factory Al Amin Factory	Solid-propellant missiles (Al Fat'h, Al Ra'd, Al Nida', 122-mm, 107-mm, 81-mm) components, assembly, and testing Solid-propellant components, rocket motor casting Solid-propellant motor testing, missile assembly Rocket bodies, motor cases Motor cases	HQ in Al Latifiyah, adjacent to Al Qa'qa'a Company Jurf-al-Sakhr, near Al Musayyib Al Latifiyah Adjacent to Al Qa'qa'a Jurf-al-Sakhr, near Al Musayyib Taji, adjacent to Nasr Company Al 'Amiriyah, adjacent to Saddam Company
Al Harith State Company	Air defense research, production and refurbishment of air defense equipment and radars	Taji
404 Group	R&D of the SA-6 (Kvadrat) air defense missile	Taji
Al Fida' State Company	Missile launch equipment (TELS and MELs), hydraulic equipment	Al Dawrah, Baghdad
Ibn-Firnas State Company Trainer aircraft factory	UAVs, air and sea munitions, aircraft maintenance and engineering	Al Tajyat, Baghdad Near the International Airport

Military Electronics Companies		
Company Name and Subordinate Elements	Primary Activities	Location
Salah-al-Din State Company	Radar equipment, antennae, communications equipment, printed circuit boards	Ad Dawr
Al 'Izz State Company	Military electronic equipment—computers, radio relays, antennae, telephone exchanges	Al Tajiyyat, Baghdad
Al Salam State Company	Surveillance equipment, secure communications equipment, electronic systems	Al Tajiyyat, Baghdad
Al Mansur State Company	Solar panels, silicon chips, electronic components, industrial gases, distilled water	Al Kazimiyah, Baghdad
Al Zawra' State Company	Electrical control panels, machine tool controls, various military and civilian electrical products	Al Za'faraniyah
Al Tahaddi State Company	Electrical motor and generator repairs, magnets, ion implantation	Al Rashad site, northeast Baghdad
28 Nisan (28 April) Center for Scientific Research	Communications and surveillance equipment	Al Waziriyah, Baghdad

Propellant, Explosives, and Munitions Companies		
Company Name and Subordinate Elements	Primary Activities	Location
Al Qa'qa'a State Company	Nitric acid, explosives, gunpowder, propellants, bomb and rocket explosives filling, sea mines	Al Latifiyah
Hittin State Company	57-mm, 122-mm, 130-mm, 152-mm, 155-mm and 210-mm artillery rounds; 60-mm, 82-mm, and 120-mm mortar rounds, RPG rounds	Al Iskandariyah
Tabuk State Company	Single- and double-base gunpowder, TNT, explosive projectile filling	Site of former Hittin Al Fat'h ammunition plant, northeast of Karbala.
Al Hadar State Company	Nitric acid for explosives and propellants production	North of Bayji near Ash Sharqat
Al Nu'man State Company	Submunition bodies for Al Fat'h and Ababil missiles, drip irrigation equipment	Southeast Baghdad
7 Nisan (7 April) State Company	All types of fuses for rockets, mortars, and artillery; artillery projectiles	Nahrawan, Baghdad
Al Yarmuk State Company	Small-arms ammunition	Abu Ghurayb
Al Shahid State Company	Brass, bronze, and copper products; brass for munitions	Al 'Amiriyah, south of Fallujah

Conventional Armaments Companies		
Company Name and Subordinate Elements	Primary Activities	Location
Saddam State Company	122-mm and 210-mm artillery pieces, military optical goods	Al 'Amiriyah, south of Fallujah
Al Qadisiyah State Company	Small arms—Kalashnikov rifles; machineguns; RPG-7 launchers; 60-mm, 82-mm, 120-mm mortars	Al Mahmudiyah, Baghdad
Hammurabi State Company	Tariq and Babil pistols	Al Hillah

Chemical Companies		
Company Name and Subordinate Elements	Primary Activities	Location
Tariq State Company	Chlorine, sodium hydroxide, insecticides, rodenticides, phenol	North of Fallujah
Al Zahaf Al Kabir State Company Mosul location	Tar paper, calcium chloride, metal products Mineral and chemical products	South Taji industrial area Former Al Jazirah plant—west of Mosul
Basrah location	Magnesium oxide (MgO), salt materials	Basrah

Procurement Companies		
Company Name and Subordinate Elements	Primary Activities	Location
Al Basha'ir Trading Company, Ltd.	Imports of equipment, tools, components, and materials for MIC and other ministries	Located near Baghdad Hotel, Baghdad
Al Mufakhir Company for Trading & Exporting, Ltd.	Imports of equipment, tools, components, and materials for MIC and other ministries	Located near Baghdad Hotel, Baghdad
Armos Trading Company, Ltd.	Import of equipment, tools, components and materials for MIC and other ministries; primarily from Russia and states using Russian equipment	Located near Baghdad Hotel, Baghdad

Miscellaneous		
Company Name and Subordinate Elements	Primary activities	Location
Ibn-Rushd (also Abu al-Rushd) State Company	Formerly the Safety and Quality Control Center—product testing, safety equipment	‘Uwayrij, Baghdad
Sinharib State Company	Irrigation and sprinkler systems, established early 2001	Al Dawrah, Baghdad, adjacent to Al Walid Training Center
Training and Qualification Directorate Training centers: Employee Development Center Al-Mu’tasim Center Al Amin Institute Al Walid Center Al Ba’th Institute for Electrical Training Al Faruq Institute Al Tahrir Institute Al Tahadi Center Al Mutaz Center	MIC staff directorate CAD and computer training, budgeting and administration training, technical lectures by foreign and academic experts Mechanical training Chemical industry training Mechanical training Electronics/electrical training Mold-making, mechanical training Welding training Mechanical training Mechanical training	HQ on top floor of the Sa’d State Company building, Baghdad Al Waziriyah, Baghdad Al Waziriyah, Baghdad Al Waziriyah, Baghdad Al Dawrah, Baghdad Al Dawrah, Baghdad, adjacent to Al Fida’ Company Al Za’faraniyah, near Al Nida’ Company Al Waziriyah Al Iskandariyah Al Iskandariyah
National Monitoring Directorate	Interface with UNSCOM/UNMOVIC and the IAEA Iraq Action Team/Iraq Nuclear Verification Office (INVO)	Al Jadriyah, Baghdad

Annex E

Iraq's Military Industrialization Facilities

Production of Munitions and Armaments

Overall Assessment of Improvements in Munitions Manufacturing

According to Minister of Military Industrialization 'Abd al-Tawab 'Abdallah Al-Mullah Huwaysh, innovations in Iraqi munitions production, a major source of income for MIC military production, created a "100 percent improvement" in this vital sector, including the renovation or construction of many factories.

Heavy Munitions Production

MIC's biggest advance in heavy munitions production—artillery and tank ammunition—was a change from brass cartridge cases to polymer (plastic) cases. Production of brass cases was dirty work, and it required the use of imported copper and brass, while MIC was able to produce plastic cases from locally made petrochemicals. MIC Deputy Dagher Muhammad Mahmud went to Russia to observe plastic munitions production, but the Russians would show him neither their techniques nor their production line. As an alternative, MIC used the private sector to aid in plastic molding. Shrinkage of the cases during molding was a problem, but Baghdad and Basrah Universities helped to solve the problem.

MIC concentrated on producing 210-mm, 155-mm, and 122-mm artillery rounds using the new polymer case process. The 210-mm round had a range of 47 km (70 km with rocket assist), the 155-mm had a range of 43 km, and the 122-mm rounds had a range of 23 km. MIC continued to produce 152-mm and 130-mm rounds using the old brass-case techniques because these calibers were still used in Iraq's arsenal.

Iraq was attempting to master the technology of tank ammunition production; however problems producing sabot rounds hindered its success. MIC was in the process of solving these problems prior to the beginning of OIF.

Al Yarmuk State Company

Al Yarmuk, an old plant with very old machinery, produced light ammunition. MIC installed new fully automated machinery that boosted production from 21 million to 140 million pieces per year. There were two main production lines: one line produced 12.7-mm, 14.5-mm and 20-mm ammunition, while the newly installed line produced 7.62 X 39-mm rounds. This line was also capable of producing 7.62 x 54-mm rounds. The ammunition produced on the new line used steel cartridge cases instead of brass.

Al Shahid State Company

Al Shahid specialized in manufacturing copper and bronze rolls, tubes, sheets and rods for civilian and military purposes. It also produced coils of brass sheet for use in munitions plants. The plant at one time had very poor quality control and a high level of waste, but the company eventually solved its production problems, both quantity- and quality-related. The former Director General (DG) of Al Shahid, Dr. Faris 'Abd al-'Aziz Mahmud, played a key role in improving the production at Al Shahid.

Al Qa'qa'a State Company

Al Qa'qa'a complex consisted of several factories responsible for making and supplying powder (propellant) and explosives for MIC munitions production. In the late 1990s, this production stopped completely due to damage sustained at Al Qa'qa'a nitric acid plant in December 1998 from Coalition cruise missile attacks. As a result, Iraq became totally dependent on imported nitric acid from Egypt for a period of time while MIC rebuilt its facilities at Al Qa'qa'a. This was a serious problem for MIC's munitions industry, which required large amounts of nitric acid. In addition to rebuilding Al Qa'qa'a's nitric acid plant, MIC also built a residual nitric acid production capability at Al Hadar State Company, to ensure Iraq remained self-reliant in nitric acid.

Hittin State Company

MIC constructed a new factory at Hittin State Company for the production of 57-mm anti-aircraft artillery ammunition, and a second new factory produced RPG-7 rounds. Hittin succeeded in extending the range of the 57-mm ammunition from 5.5 km to 9.7 km. Many parts for these rounds were produced by the private sector and by the MIC training centers. Hittin also produced complete lines of several calibers of heavy ammunition including 122-mm, 130-mm, 152-mm, and 210-mm.

The foundry at Hittin was used to produce 60-mm, 82-mm, and 120-mm mortar projectiles. The foundry was completely renovated with Russian assistance to solve a few unspecified problems at the facility. This Russian assistance ended with the outbreak of OIF.

Tabuk State Company

The Tabuk State Company was another new company that specialized in the manufacturing of single- and double-base powders, TNT explosives, and filling hard ammunition. It was to include the filling plant that once belonged to Hittin State Company (Hittin's Al Fat'h Factory). The DG of Tabuk, Karim Daydan 'Umran Rimayid Al Kartani, was previously the Deputy DG of Al Qa'qa'a'.

Arms Production

Al Qadisiyah State Company

Al Qadisiyah State Company, which produced pistols, rifles, RPG-7s, and mortars, improved both the quantity and quality of its production from 1997 to 2003. The Al Qadisiyah plant had a number of serious problems when Abd-al-Tawab Al-Mullah Huwaysh took over MIC, including many inoperable machines, the inability to obtain imported parts, and poor production practices. There were also problems with sizing and tools which resulted in improper machining tolerances.

To remedy these problems, MIC reorganized the Al Qadisiyah tooling shop and gave authority to the shop's quality-control personnel to stop production whenever tolerances exceeded standards. For needed

replacement parts MIC gave authority to obtain some from private sector suppliers and to import others. In 1997, many machines at Al Qadisiyah were idle and inoperable for lack of maintenance, but none were idle in 2003.

Huwaysh appointed Yahya Nasif Jasim to be the DG of Al Qadisiyah. 'Amir Al-Sa'di described Yahya Nasif Jasim as one of Iraq's brightest and most capable managers. Jasim came to MIC from PC-3, and he was the DG of Al Nida' State Company when he was appointed head of Qadisiyah. By 2003, Al Qadisiyah was producing rifles, pistols, and RPG-7s at maximum plant capacity.

Hamurabi State Company

MIC also created the Hamurabi State Company in 2002. The Hammurabi pistol factory, subordinate to Al Qadisiyah State Company, existed for many years but pistol production was divided between Hammurabi and the main Al Qadisiyah plant. MIC intended to consolidate all pistol production at Hammurabi and built a new plant in Hillah, imported new machinery for the company, and moved some equipment to the site from Al Qadisiyah. The plant was still under construction when OIF began in March 2003. Iraq produced three pistol models: a 7-mm, the 9-mm Tarik, and the 9-mm Babil.

Saddam State Company

Saddam State Company (name changed to Al Akha State Company after the Regime fell) produced 122-mm artillery pieces, 155-mm gun barrels, 260-mm Ababil-50 rocket launchers, and 82-mm and 120-mm mortar tubes. For the 122-mm artillery pieces, Saddam cooperated with Al Radwan State Company and Ibn-al-Walid State Company. Al Radwan made the base and frame, Ibn-al-Walid produced the gears, and Saddam manufactured the barrels and mounts, and performed final assembly. Saddam State Company also made military optical goods such as artillery and mortar sighting devices, binoculars, sniper rifle sights, and RPG-7 sights. Other activities included a factory that produced mechanical parts for different Saddam departments, a project doing research and development on graphite cylinders for electrodes in electric metalworking furnaces, and

a project to design a self-propelled 210-mm gun or howitzer using T-54 and T-55 tank chassis that did not come to fruition.

Production of artillery tubes at Saddam was dependent on barrel castings and forgings, either imported or obtained from Al Samud State Company, and efforts to correct problems at Al Samud were motivated by the desire to boost output at Saddam. In 1999, Saddam Husayn directed MIC to increase its artillery production (155-mm and 210-mm) from 25 per year to 500 per year. Huwaysh determined that the transition process would take at least three years—100 artillery pieces during the first year, 200 the second year, reaching 500 by the end of the third year. According to ‘Amir Al-Sa’di, the design capacity of the Saddam plant was 200 pieces per year with the ability to double this figure by adding some critical equipment and farming some of the work out to sister companies, exactly the tack MIC was taking by 2003.

To meet these production goals, the artillery manufacturing effort was split between Saddam State Company and other establishments, principally Al Radwan State Company. Saddam concentrated on production of gun tubes, while Al Radwan produced the undercarriages. Saddam and Al Radwan also subcontracted some work to the private sector. Saddam produced the gun tubes, assembled the components, and performed all quality control checks on the completed systems. Al Nida’, Al ‘Ubur, Al Amin, and Al Radwan were all involved, given the huge scale of the project. Al Samud was to provide near-net-shape forgings to be used to make the tubes. Previously Saddam received only rough shapes from Al Samud. The plants also boosted production by expanding to three shifts. Saddam State Company achieved production of 100 artillery pieces by the end of 2001, 200 by the end of 2002, and was on track to meet its target of 500 pieces in late 2003.

New and Evolving MIC Companies (as of March 2003)

Sinharib State Company

Sinharib was a new company that MIC established in early 2001. Sinharib produced agricultural irrigation and sprinkler systems using plastic pipe and had an income of 23 billion ID per year. The company manufactured its products with the assistance of 120 private sector subcontractors. Huwaysh saw this arrangement as permitting a small number of government employees to guide the production activities of a large number of private sector personnel. The Ministry of Industry and Minerals (MIM) also produced irrigation equipment but used metal pipe, which was subject to corrosion and required imported materials, whereas the plastic pipe was locally made from indigenous materials.

Al Samud State Company

MIC created facility with its foundry and forging shop within the Nasr State Establishment in 1989-90, and the facility was originally designed to provide intermediate product to the Saddam State Establishment artillery plant. The plant, along with the rest of Nasr, was returned to MIM after the flight of Husayn Kamil. MIM created Al Samud as an independent state company in 1996, but Huwaysh convinced Saddam Husayn to allow him to move it to MIC in 2001, because it served MIC’s needs exclusively. It specialized in heavy alloys, forging, galvanizing, mobile roof cranes, and equipment specific to electrical and communications requirements. As mentioned earlier, Al Samud provided forged steel blanks for artillery gun barrels. The forging plant also had the capability to produce components for the Iraqi railways.

Previously, MIC imported its artillery tubes from Russia and Yugoslavia. As part of a self-sufficiency move, Saddam decided to begin manufacturing them indigenously. Such production required high metallurgical standards to create satisfactory barrels.

Al Nasr Al 'Azim State Company

From 1990 until 1997, Al Nasr Al 'Azim State Company was known as the State Establishment for Heavy Engineering Equipment (SEHEE). The Ministry of Oil initially established a workshop in Dawrah to serve as an industrial service facility for the oil industry. Husayn Kamil took control of the Dawrah factory and transferred it to MIC after MIC assumed responsibility for Petrochemical Project #2 and its accompanying refinery. MIC greatly expanded the plant's capacity and range of products in order to produce large boilers, pressure tanks and tubes, reactors, high-pressure vessels for gases and heat exchangers. After Husayn Kamil fled to Jordan in August 1995, 'Amir Muhammad Rashid Al-'Ubaydi, then acting Director of MIC and Minister of Oil, returned SEHEE to the Ministry of Oil. The company was renamed 'Al Nasr Al-'Azim' in March 1997. Huwaysh reclaimed the company for MIC in 1998 after a struggle with 'Amir Rashid. Later MIC had a contract with China for the production of boilers with a capacity of up to 1,000 tons of steam to be produced at Al Nasr Al-'Azim.

Ibn-Majid Company

Ibn-Majid was originally a unit created in 1990 for the production of steel plate barges and river platforms, as well as small boats of up to 100 tons capacity. It was then expanded by MIC to produce the same range of products as Al Nasr Al 'Azim. Ibn-Majid produced items to meet the demands of the southern Iraq oil industry concentrated in the region around Basrah. Ibn-Majid became a company in 1999.

Al 'Ubur State Company

Al 'Ubur produced pumps and castings, such as T-72 engine blocks. The facility also conducted die casting, including the die casting of magnesium components for the electronics industry, and produced oil tanks.

Umm al-Ma'arik State Company

Umm-al-Ma'arik's mission was to manufacture heavy mechanical parts for large projects such as dams, irrigation systems, and cement and phosphate factories. It had a foundry for producing cast iron and steel. Its heavy mortar shell casting line for 120-mm mortar projectiles was equipped with new machinery

from Russia and Belarus and produced 200 pieces per day. MIC moved the flow forming machines from the Rashid State Company's Dhu-al-Fikar factory to Umm-al-Ma'arik where they were used to produce motorcases for Al Ababil-50 and Al Nida' rockets, and the Al Fat'h missile. Umm-al-Ma'arik also had a special welding capability for aluminum and stainless steel similar to the capability at Al Nida' and Al Nasr Al 'Azim.

Al Radwan State Company

MIC was constructing a huge vessel factory in the northeast corner of the Al Radwan plant site. Al Radwan was also to produce artillery system undercarriages in conjunction with Saddam State Company and the private sector. Another project was the production of water purification units capable of handling 200 cubic meters of water per hour.

Al Basha'ir, Al Mufakhir, and Armos Companies

Al Basha'ir Trading Company, Al Mufakhir Company for Trading and Exporting, and Armos were MIC-owned procurement companies that helped Iraq evade UN trade sanctions. These three companies were headed by directors, not directors general, which was the typical rank of the 49 other state company chiefs within MIC. Munir Mamduh 'Awad Al-Qubaysi, for example, was the Director of Al Basha'ir. All three companies were located in the same building located on a side street west of Sa'dun Street near the Baghdad Hotel in central Baghdad. MIC began work to construct a headquarters building for the companies in the Al-Waziriyah quarter of Baghdad.

The 404 Group

The 404 Group consisted of four individuals, two of whom were former MIC directors general in the early 1990s. Since 1997, the group attempted to modify the Kvadarat (SA-6) air defense missile system to enhance its performance and make it less vulnerable to antiradiation missile attack. The proposal included long-range radar detection and acquisition linked to a passive video tracking and targeting system with a range of 25 km. Dayf 'Abd al-Majid Ahmad, Huwaysh's predecessor at MIC, created and funded the 404 Group while he was Deputy Director of the

Presidential Diwan. After Saddam designated Dayf to be the Iraqi ambassador to Belarus in 2001, Dayf briefed Saddam on the group's research and suggested it continue under MIC auspices and funding. Saddam endorsed this proposal without consulting Huwaysh. Huwaysh was angry when he discovered MIC inherited from Dayf a new, unfunded project. Wedded to his plans, Huwaysh resented "any activity that was distracting to us [in MIC]."

Independently, the 404 Group decided to design and build a long-range cruise missile, possibly by replacing the engine in the HY-2 (Silkworm). This effort was still in the concept stage when Huwaysh inherited the 404 Group, but rumors about its projected 2,500-km range spread widely. As soon as the group came under MIC control, Huwaysh canceled further work on the long-range cruise missile because he believed the proposed concept was not feasible. However, Huwaysh allowed it to continue for one more year because Saddam already approved the 404 Group's air defense work. At year's end, he intended to integrate their results into ongoing air defense efforts at Al Harith State Company. War with the Coalition intervened before the project produced any concrete results.

The 28 Nisan Group

Headed by a university professor, the 28 Nisan Group included over a hundred people. Its genesis in 1997 in the Presidential Diwan, under Dayf 'Abd al-Majid Ahmad's sponsorship, and its eventual handoff to MIC paralleled that of the 404 Group. Both groups were accustomed to unlimited budgets and minimal oversight. The 28 Nisan Group sought the capability to intercept and decode enemy air-to-air and air-to-ground radio transmissions in the "S" band for Iraqi military intelligence, and also to produce a signal range finder. The equipment it developed, including antennae array, would fit inside a van.

The group produced and delivered four vans and had an order for another four when Coalition operations intervened. Dr. 'Abd al-Husayn Al Haariri, the group leader, was also using the group to pursue another scheme called *Al Fil* (the Elephant) that Huwaysh found incredible. Al Fil, projected by 'Abd al-Husayn to cost millions of dollars, centered on attacking American naval vessels in the Strait of Hormuz and in the Persian Gulf using small, explosive-laden, remote-controlled boats. A secret facility in Abu Dhabi, linked to a master site in Baghdad by Thuraya telephone, would provide command and control for the boats. When Huwaysh questioned 'Abd al-Husayn about how he was going to operate a clandestine command and control site in a hostile environment, while actively transmitting to a fleet of small boats, 'Abd al-Husayn did not have satisfactory answers.

Huwaysh attempted to stop the research; however, he was immediately censured by Saddam (who 'Abd al-Husayn had already co-opted) and ordered to continue the work. As an alternative, Huwaysh convinced Saddam to shift Al Fil to the Iraqi Intelligence Service (IIS), because IIS was to be the ultimate end user. In short order, Huwaysh got a call from IIS Director Tahir Jalil Habbush, who complained about the "impossible project" that Huwaysh had handed off to him. Finally, with the IIS Director weighing in, Saddam canceled Al Fil. Two months after 'Abd al-Husayn and the 28 Nisan Group joined MIC, Huwaysh fired him. 'Abd al-Husayn protested directly to Saddam who again challenged Huwaysh's decision. Huwaysh explained to Saddam that he could not have someone who refused to work within the MIC system and insisted on an unconstrained budget. After replacing 'Abd al-Husayn, Huwaysh moved the 28 Nisan Group under Al-Milad State Company to impose planning and budgetary discipline on its activities.

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