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**Defense Nuclear Agency
Alexandria, VA 22310-3398**



DNA-TR-92-115

Iraq Inspections—Lessons Learned

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3031 Javier Road
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January 1993

Technical Report

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13. ABSTRACT (Maximum 200 words) United Nations (UN) Resolution 687 established the basis for inspections of Iraq's nuclear, chemical, biological and ballistic weapons programs. This study, conducted under DNA's ongoing adversarial analysis program, assesses lessons learned from the UN Special Commission (UNCOM) inspections for the implementation of future and ongoing arms control treaties. Lessons learned are divided into two categories: (1) camouflage, concealment and deception, and other means of obstruction that might undermine the effectiveness of on-site inspections (OSI) and (2) general lessons on the implementation of OSI, including organization, logistics, etc.				
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EXECUTIVE SUMMARY

The purpose of this study is to analyze the inspections conducted in Iraq pursuant to the implementation of UN Security Council Resolution 687 (1991) for lessons relevant to the implementation of future and ongoing arms control treaties and associated verification regimes. These lessons can enhance the training of inspectors from the UN and its subsidiary organizations, and other organizations preparing for the implementation of various on-site inspection regimes. Particular focus is placed on determining what methods of camouflage, concealment, and deception (CCD) were used by Iraq to prevent detection of its weapons programs and to inhibit the UN Special Commission (UNSCOM) inspections. The analysis of these inspections constitutes a particularly fertile case study under the Defense Nuclear Agency's Adversarial Analysis Program.

The principal source materials for the research are reports from UNSCOM (IAEA) nuclear missions reports and interviews with selected inspectors. A total of 37 individuals were interviewed, 29 of whom were inspectors; the remainder were either in support or management roles for UNSCOM. Most of those interviewed participated in multiple inspections. Due to travel fund limitations, only Western inspectors were interviewed.

At the time of the research and writing of this study, the first half of 1992, the UNSCOM process is ongoing. This report explores lessons to be learned from UNSCOM based on inspections through UNSCOM 35. Any conclusion about the success or failure of UNSCOM in its mission to identify and destroy Iraqi weapons capability at this time is preliminary. History will demonstrate whether Iraq's weapons and capabilities escaped UNSCOM scrutiny, or were readily regenerated despite the UN's best efforts.

Some conclusions are possible to draw at this time. In terms of success, it is clear that UNSCOM inspections made tremendous achievements, including:

- A nuclear weapons program, previously denied by Iraq, was uncovered despite intensive Iraqi concealment efforts.
- An offensive biological weapons program was admitted and some details on its scope were obtained.
- The extent and nature of Iraqi chemical weapons production and delivery capabilities were defined.

- Destruction of equipment and facilities important to the Iraqi programs was initiated.

On the other side of the ledger, there are some problems. Clearly, Iraq has not been forthcoming in many instances; extensive capabilities and weaponry may remain undeclared. Some problems about which UNSCOM can do little are:

- The nuclear program may be much more extensive than thus far uncovered. There may, for example, be an undeclared plutonium production reactor, perhaps underground.
- Iraq may have hidden chemical agents and/or precursors, as well as equipment for chemical production and weaponization.
- Biological agents, weapons, and production equipment may be hidden.
- There are perhaps several hundred undeclared missiles and, probably, missile production equipment hidden from inspection teams.
- Iraqi scientists and infrastructure will remain once the UNSCOM process ends, or slacks, leaving the base from which Iraq can regenerate its weapons programs.

A central point to be learned from the inspections in Iraq--independent of the quality or accomplishments of UNSCOM--is that a non-cooperative inspectee can succeed in defeating the aims of the inspection to some extent. During the inspections, Iraq continued to camouflage, conceal, and deceive. In assessing lessons relevant to arms control, this report analyzes Iraqi behavior designed to defeat detection, verification, and destruction of its programs. Specifically, this report draws lessons to be learned regarding the vulnerabilities of arms control verification, and the means and ease of circumventing export control regimes. It also analyzes possible break-out scenarios, based on potential hidden Iraqi capabilities, and the risks that they pose.

Among the lessons learned from the UNSCOM inspections, general techniques used by Iraq to camouflage, conceal and deceive were fairly consistent across its four weapons programs - nuclear, chemical, biological and missile. Primary techniques employed include:

- Information was withheld, manipulated, and/or distorted.
- Equipment was sometimes removed before inspectors arrived.
- Weapons and production equipment have been hidden and not declared.

- Because the "rules" of the inspections were not specified, Iraq took the initiative to set the agenda and timetable.
- Interviews were controlled; very limited number of personnel were presented to the inspection teams.
- Iraq limited or denied access to some facilities.
- Indigenous production capabilities were developed, where possible, to bypass international export controls or scrutiny.
- Dummy buildings and bunkers were used.
- Unilateral, unobserved destruction of equipment and facilities took place to hinder verification.

Other lessons were derived relating to facets of inspections not directly related to CCD techniques. These lessons include:

- The team leader must have exceptional management and interpersonal skills to enable him or her to be tough, adversarial, or gentle and cajoling, as needed.
- The team must be expert in the technologies in question
- The team members must be trained to recognize deceptive practices.
- There has been excessive reliance on overhead photography for intelligence about Iraq's programs. Stated in other terms, there was a significant lack of human intelligence about Iraq's capabilities.
- Time is not on the side of inspections. A potential violator may be able to "out wait" the inspections process through delays and denials, especially if accompanied by abuse or harassment.

It should be noted that each section of this report is written, as requested, to be able to stand on its own. Thus, for example, there are some lessons in the nuclear area that are similar to those in the chemical area. Yet, there are clear differences between the lessons to be learned from one weapons area to another (e.g., the lessons from the BW program are not necessarily applicable to those of the missile program). For this reason, the sections are not exactly parallel in construction.

The following section-by-section summary is intended to preview material available in the study, but does not attempt to discuss the "lessons learned" since they are too extensive and disparate.

Section-by-Section Summary

Section 1. Introduction.

This section summarizes the objectives and scope of this report. The basis for, and objectives of the inspections are described. An assessment of what lessons can, cannot, and should be learned from the inspections relevant to future arms control verification regimes is described.

Section 2. Chemical Weapons Inspections.

Iraq succeeded in producing high-purity mustard as well as the nerve agents sarin and tabun. These agents had been weaponized in bombs, artillery shells, mortars, rockets, and missile warheads. The facilities for agent and precursor production and storage at known sites were extensively damaged during Desert Storm bombing. Inspectors found that documentation on processes and production, as well as some equipment, had been removed. There were numerous discrepancies in Iraqi declarations resulting from intentional misrepresentations, errors, and misunderstandings. The Iraqis used a number of techniques to slow or foil the inspections, and sought to control the information that the inspectors could acquire. All of the inspectors interviewed concluded that Iraq may have hidden chemical agent and/or chemical production equipment.

Section 3. Biological Weapons Inspections.

Under questioning from the first biological weapons (BW) inspection team, Iraq admitted having an offensive BW research program, but denied ever having produced weapons. As in the other three types of inspections, the BW UNSCOM teams met with resistance, such as Iraqi objection to the use of aerial reconnaissance and photography, and noncooperation. The teams inspected several sites that could have been used for BW research and production, but were not used as such at the time of inspection. The most suspicious facility, Al Hakam, is a military-type site that may have been planned as a BW production plant. Iraq has the know-how and the technical infrastructure to produce BW in short order. Also, seed stocks of BW agent could likely be hidden from inspectors, with little possibility of detection, and could be used to replenish stockpiles at a later time.

Section 4. Nuclear Weapons Inspections.

Iraq had denied having a nuclear weapons program, but UNSCOM/IAEA inspections discovered an extensive effort to acquire enriched uranium (via electromagnetic isotope separation, chemical exchange, and gas centrifuge) and separate plutonium, as well as efforts to design a nuclear device. These programs were concealed by careful plans to eliminate or limit emissions and other signatures that might have "tipped off" foreign intelligence agencies about the activities. Inspectors were continually confronted with false statements and subterfuge. For example, equipment was loaded onto a truck and transported around a site to evade inspectors. Iraq demonstrated highly effective communications and "management" of the inspectors and their time.

Section 5. Ballistic Missile Inspections.

Iraq was able to extend the range of its Soviet-origin Scud missiles and to manufacture Scud components. They also had made significant strides toward developing a supergun, which depended heavily on foreign expertise and components. The latter was destroyed under supervision of UNSCOM (although its fuel purportedly was destroyed unilaterally). UNSCOM inspectors believe that as many as several hundred missiles are still hidden. Many sites had been stripped of their equipment and items were continually discovered that should have been declared.

Section 6. Iraqi Circumvention of Export Controls.

The export control regimes intended to limit nuclear, chemical, and missile proliferation are described. Iraq circumvented these regimes by:

- Establishing front companies;
- Using supplier countries not in the regimes;
- Depending on inferior materials and components;
- Purchasing from companies willing to violate regime guidelines, and
- Developing indigenous capabilities whenever possible.

Iraq also emphasized technologies that would not ordinarily be expected, and therefore not covered by export controls (e.g., the supergun, electromagnetic isotope separation). They were also willing to accept lower quality than most Western countries would accept, such as nerve agents that were not of high purity, and therefore not storable.

Section 7. Iraq's Disinformation and Propaganda Campaign.

Iraq undertook a campaign to convince other countries--particularly Arabic-speaking countries--that it is the victim of Western neo-colonialism and attempts by the United States and Israel to strip Iraq of its industrial infrastructure and rightful political role in regional and international politics. This campaign stressed legalistic arguments that Iraq is in compliance with international law, and the theme that its innocent people are suffering in an unwarranted fashion from the trade embargo.

Section 8. Potential Break-out Scenarios.

An important question in evaluating the success of the UNSCOM missions is: Even if the facilities for manufacture of weapons of mass destruction are identified and destroyed, will Iraq have the ability to reassemble the technical expertise and infrastructure for its weapons programs? This question is explored in hypothetical scenarios. The conclusion reached is that the process of restarting the weapons programs would be relatively quick and inexpensive for chemical and biological programs; while it would be expensive, but feasible for nuclear and missile programs.

Section 9. Conclusions.

Inspections in Iraq have been unique. Iraq was defeated in war, subject to anytime-anywhere inspections, and with the constant threat of renewed hostilities in the event of noncompliance. Nevertheless Iraq has been defiant and crafty, and has avoided giving a full, detailed disclosure of their weapons and capabilities, as required by Resolution 687. This section summarizes concealment and deception techniques employed by Iraq intended to detour or derail the inspection process, that were common to most or all of the various inspection areas. Notable examples of such deception include false or incomplete declarations, removal of equipment and documentation, and the concealment of personnel involved in a particular weapons program.

Appendixes

Six appendixes are: (A) the methodology for interviewing inspectors; (B) a list of sites inspected by the UN; (C) UN Security Council Resolution 687 (1991), which established UNSCOM; (D) UN Security Council Resolution 707 (1991), which emphasized the need for Iraq to issue a full, final and complete disclosure of its weapons programs; and (E) UN Security Council Resolution 715 (1991), which establishes the

procedures for long-term monitoring of and verification in Iraq; and (F) a conversion table.

CONVERSION TABLE

Conversion factors for U.S. customary to metric (SI) units of measurement

To Convert From	To	Multiply
angstrom	meters (m)	1.000 000 X E-10
atmosphere (normal)	kilo pascal (kPa)	1.013 25 X E+2
bar	kilo pascal (kPa)	1.000 000 X E+2
barn	meter ² (m ²)	1.000 000 X E-28
British Thermal unit (thermochemical)	joule (J)	1.054 350 X E+3
calorie (thermochemical)	joule (J)	4.184 000
cal (thermochemical)/cm ²	mega joule/m ² (MJ/m ²)	4.184 000 X E-2
curie	giga becquerel (GBq)*	3.700 000 X E+1
degree (angle)	radian (rad)	1.745 329 X E-2
degree Fahrenheit	degree kelvin (K)	$t_K = (t_F + 459.67)/1.8$
electron volt	joule (J)	1.602 19 X E-19
erg	joule (J)	1.000 000 X E-7
erg/second	watt (W)	1.000 000 X E-7
foot	meter (m)	3.048 000 X E-1
foot-pound-force	joule (J)	1.355 818
gallon (U.S. liquid)	meter ³ (m ³)	3.785 412 X E-3
inch	meter (m)	2.540 000 X E-2
jerk	joule (J)	1.000 000 X E+9
joule/kilogram (J/Kg) (radiation dose absorbed)	Gray (Gy)	1.000 000
kilotons	terajoules	4.183
kip (1000 lbf)	newton (N)	4.448 222 X E+3
kip/inch ² (ksi)	kilo pascal (kPa)	6.894 757 X E+3
ktop	newton-second/m ² (N-s/m ²)	1.000 000 X E+2
micron	meter (m)	1.000 000 X E-6
mil	meter (m)	2.540 000 X E-5
mile (international)	meter (m)	1.609 344 X E+3
ounce	kilogram (kg)	2.834 952 X E-2
pound-force (lbf avoirdupois)	newton (N)	4.448 222
pound-force inch	newton-meter (N·m)	1.129 848 X E-1
pound-force/inch	newton/meter (N/m)	1.751 268 X E+2
pound-force/foot ²	kilo pascal (kPa)	4.788 026 X E-2
pound-force/inch ² (psi)	kilo pascal (kPa)	6.894 757
pound-mass (lbm avoirdupois)	kilogram (kg)	4.535 924 X E-1
pound-mass-foot ² (moment of inertia)	kilogram-meter ² (kg·m ²)	4.214 011 X E-2
pound-mass/foot ³	kilogram/meter ³ (kg/m ³)	1.601 846 X E+1
rad (radiation dose absorbed)	Gray (Gy)**	1.000 000 X E-2
roentgen	coulomb/kilogram (C/kg)	2.579 760 X E-4
shake	second (s)	1.000 000 X E-8
slug	kilogram (kg)	1.459 390 X E+1
torr (mm Hg, 0°C)	kilo pascal (kPa)	1.333 22 X E-1

*The becquerel (Bq) is the SI unit of radioactivity: Bq = 1 event/s.

**The Gray (Gy) is the SI unit of absorbed radiation.

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SECTION 1 INTRODUCTION

1.1 OBJECTIVES.

The purpose of this study is to analyze the inspections conducted in Iraq pursuant to implementation of UN Security Council Resolution 687 for lessons relevant to arms control verification. Particular focus is placed on determining what methods of camouflage, concealment, and deception (CCD) were used by Iraq to prevent detection of their weapons programs and to inhibit the UN Special Commission (UNSCOM) inspections. The principal source materials for the research are reports from UNSCOM nuclear missions (i.e., International Atomic Energy Agency reports) and interviews with selected inspectors. A total of 37 individuals were interviewed, 29 of whom were inspectors; the remainder were in support or management roles for UNSCOM.

In analyzing lessons relevant to verification and arms control, this report assessed Iraqi behavior designed to defeat detection, verification, and destruction of their programs. Specifically, this report draws lessons to be learned regarding the vulnerabilities of arms control verification, and the means and ease of circumventing export control regimes. It also analyzes possible break-out scenarios, based on potential hidden Iraqi capabilities, and the risks that they pose.

A central point to be learned from the inspections in Iraq--independent of the quality or accomplishments of UNSCOM--is that a non-cooperative inspectee can succeed in defeating the aims of the inspection to some extent. How much Iraq has been able to successfully conceal is, by definition, unknown. It is clear, however, that Iraq has sustained a substantial CCD effort that continues, as of this writing, to prevent full and complete disclosure.

At the time of the research and writing of this study, the first half of 1992, the UNSCOM process is ongoing. This report explores preliminary lessons to be learned from UNSCOM based on the completed inspections. Any conclusion about the success or failure of UNSCOM in its mission to identify and destroy Iraqi weapons capability at this time is preliminary. History will demonstrate whether Iraq's weapons and capabilities escaped UNSCOM scrutiny, were readily regenerated despite the UN's best efforts, or were truly destroyed.

It should be noted that each section is written, as requested, to be able to stand on its own. Thus, for example, there are some lessons in the nuclear area that are similar to those in the chemical area. Yet, there are clear differences between the lessons to be learned from one weapons area to another (e.g. the lessons from the BW program are not necessarily applicable to those of the missile program). For this reason, the sections are not exactly parallel in construction.

1.2. SCOPE OF LESSONS TO BE LEARNED.

The inspections of Iraq provide the opportunity to draw upon experience as the basis for formulating decisions in the development of organizations, procedures, verification regimes, logistic support, and other elements in the implementation of various arms control treaties. In drawing lessons from the UNSCOM inspections, several general points should be kept in mind:

- Iraq's loss in war created *unprecedented degree of intrusiveness*-- inspections are permitted anytime and anywhere, and Iraq has no right of refusal. A similar situation is highly unlikely to be repeated in the foreseeable future. The degree of intrusiveness is further enhanced by the Security Council's willingness to threaten the use of force to implement UN resolutions.
- The political urgency of the inspections more likely reflect challenge inspections under future treaties; lessons more directly applicable to other treaties are more likely to be drawn from the long-term compliance monitoring of Iraqi facilities.
- Foreknowledge of Iraq as a "bad guy," that is, it was known to be in violation of international laws and obligations, affected the conduct of the inspections, in contrast to future challenge inspections under the CWC and other treaties where the inspected state will be at least legally suspect.
- Inspectors are provided to UNSCOM on an *ad hoc* basis primarily from Western nations. In future inspection regimes, inspectors may be more representative of a broad cross-section of the international population, and may not be as technically experienced with weapons of mass destruction.

- Lessons learned are not all discouraging--several aspects of inspections and intelligence proved highly accurate and useful.

Several other aspects of the UNSCOM inspections were unique to Iraq. Iraq's climate, types of facilities inspected, multinational cooperation, and preparedness prevent applying lessons from Iraq directly to future treaties. However, the indirect lessons can be valuable, and to a degree, lessons can be derived that are valuable for the organizational and logistic support of future multinational verification regimes.

Interviews fall into four categories: chemical, biological, nuclear, and missile inspections. Lessons learned from these inspections are based largely on interviews with those who participated in the inspection process. The authors are grateful for the many hours spent by inspectors and UNSCOM support personnel in interviews and reading drafts of this report. The authors of this report accept responsibility for its substance. Every attempt has been made to accurately represent the insights provided by the interviewees. In some cases there were differences in views among inspectors. The authors have sought to identify such instances, and to indicate prevailing interpretations and conclusions.

SECTION 2

CHEMICAL WEAPONS INSPECTIONS

This section outlines Iraqi chemical weapons capabilities, briefly describes the UNSCOM chemical weapons missions, and analyzes the missions to define lessons applicable to drafting and implementing a potential Chemical Weapons Convention (CWC). The analysis section is divided into two parts: practical lessons relevant to inspections implementation, and lessons regarding the ability of inspections to detect noncompliance.

2.1 IRAQI CHEMICAL WEAPONS CAPABILITIES.

Iraq made mustard and nerve agents, including sarin (the Iraqi definition of which may refer to GB, GF, or a combination of the two) and tabun (GA). They also experimented with VX and possibly other agents. Precise estimates of Iraq's production of agents prior to Desert Storm are unavailable, but they had the capacity to produce more than 1,000 tonnes per year.

Iraq had developed multiple modes for delivering their various CW agents. Seventy-five chemical warheads for ballistic missiles were discovered by inspectors, including GB/GF-filled and binary warheads.¹ In addition to delivery by missile, Iraq's chemical arsenal included aerial bombs, artillery rockets, artillery shells, modified cluster bombs, and mortars. (See Table 2-1 for a listing of Iraqi chemical munitions.) During the war against Iran, Iraq used several of these munitions types, and also dropped barrels filled with agent from helicopters against Iranian troops. Furthermore, several rocket calibers were used against Iran that were not declared by Iraq.

Several inspectors were surprised at the high purity of mustard found--generally around 90%. Because storability is a function of purity, Iraq would be able to successfully store mustard, if they were to choose to hide agent. However, it is also possible that Iraq would choose to hide agent intermediates such as DF, and separately, mixed alcohols.

¹ Considerable confusion was introduced by Iraq's use of the term binary. Iraq used the term to refer to a mixture of GB and GF, as well as to true binary chemical weapons--the storage of compounds separately, with mixing only when a weapon is desired. Iraqi binary delivery systems were first filled with an alcohol. DF (Methylphosphonyl difluoride) was added shortly before use; DF plus isopropanol or cyclohexanol mixed to produce GB or GF respectively, or mixed for a GB/GF blend.

Table 2-1. Iraqi CW agent delivery systems.

155mm artillery shells	82mm mortars
DB-2 500 kg aerial bomb	PROSAB-250 Cluster bomb (modified)
Al Hussein ballistic missiles	OFAB-500 SHR Cluster bomb (modified)
122mm artillery rockets	M9045 250 kg bomb
LD 500 gauge bomb	M904 500 kg bomb
LD 250 gauge bomb	155 mm artillery projectile (M82)
V-429 artillery projectile	

The production of CW agents was managed by the Muthanna State Establishment, which incorporated the Al Muthanna complex and its subsidiary facilities--the three Fallujah facilities and the storage site at Muhammadiyat. The main site, Al Muthanna, was used for the production of agent and precursors, and for filling munitions. The facility had an extensive production capacity which could have produced thousands of tonnes of agent annually prior to its destruction. In addition to agent production, Al Muthanna was the site of several precursor production facilities, and storage for several dozen types of chemicals.

Bomb damage and destruction of Al Muthanna was incomplete. In one area, four facilities were surrounded by sand berms, approximately 13 dummy sites, and mounds for anti-aircraft batteries. Three of their facilities were inspected. Two of the facilities were identical pilot plants (bunker-type structures, partially underground), which they were unscathed. Although the purpose for these plants is not known (Iraqis claimed they were for precursor chemical production), they are built to extremely high standards and could possibly be used for nerve agent production. A third pilot plant, which appeared to be destroyed, was not inspected. The fourth facility was an inhalation chamber for lethality estimations.

Another part of Al Muthanna contained a second chemical production area that was more extensively damaged. It contained five production facilities and six dummies. One of the five facilities had been a sarin production plant. It was in operation from 1986 to 1988, when damage to a reactor caused it to close. Production then shifted to a second plant that contained two operational units. This plant was in use until its alleged dismantlement in October 1990. UNSCOM inspectors found that all piping and major

vessels had been removed from the first facility; the second sarin plant was destroyed by Desert Storm bombing and therefore was not inspected.

At the first sarin facility, Iraq had been able to make agent in 2.5-tonne batches, with one batch every 24 hours. Sarin purities of 40-60% had been achieved. The plant had been able to operate continuously, if necessary. Iraq's sarin was unsuitable for long-term storage because high HF concentrations caused fairly rapid decomposition. (Iraq's procedure was to manufacture agent as needed and use it right away.) During the inspections it was noted that sarin decomposed 10-15 percentage points every two to three months. Hence, under optimal circumstances, sarin could be stored for little more than one year. Iraq's munitions, ordinarily kept in bunkers designed for CW storage, had been dispersed into the open desert to avoid bombing. Higher temperatures there increased the rate of decomposition.

Near the sarin production plant, there were four other facilities. None were inspected, but all appeared to be heavily damaged or destroyed. The declared purposes of these facilities were: production of methyl phosphonyl dichloride (MPC, an intermediate product for DF); dimethyl methyl phosphonate (DMMP); MPC and D4, intermediates for sarin and tabun, respectively; and mustard agent. The capacity of the mustard plant was said to have been 5 tonnes/day, with the last production having been in October 1990.

Other areas of Al Muthanna include facilities for storage of chemicals and explosives, manufacture of aerial bomb cases, and filling of chemical munitions. There are eight impressive, air-conditioned bunkers for chemical weapons storage. Several of these facilities were damaged by bombing and were rendered hazardous to inspectors by unexploded ordnance and spilled chemicals. It was therefore impossible to inspect them to determine their purpose, status, or whether equipment had been removed.

Fallujah 2 was the most developed of three sites designed to produce and provide precursor chemicals to Al Muthanna. Thionyl chloride and methyl phosphonic dichloride were produced in very small quantities, and there were unrealized plans to make methyl phosphonic difluoride (DF) and trimethyl phosphite (TMP). Additionally, there was a facility under construction to produce phosphorus trichloride and phosphorus oxychloride. Table 2-2 illustrates production at Fallujah 2.

Bomb damage to Fallujah 2 was heavy. The only two units which could still be rendered operational were the chlorine plant, parts of which were undamaged, and the

phosphorus trichloride/phosphorus oxychloride production unit. The latter, while undamaged, was not operational because its control instrumentation was unfinished.

Table 2-2. Production at Fallujah 2 (pre-Gulf War).

PRODUCT	QUANTITY
Chlorine	10 - 12 tonnes/day (actual production)
Hydrochloric acid (35%)	10 - 12 tonnes/day HCl (100% capacity)
Caustic soda (33%)	33t/day NaOH 100% (actual production)
Sodium hypochlorite	10 - 12 tonnes/day (capacity)
Sulphur trioxide	A few runs only
Sulphur chloride	Two runs only
Thionyl chloride	Two runs only
Methyldichlorophosphonate	Two runs only
Methyldifluorophosphonate	(DF) Two runs only

Fallujah 3 was never used to produce CW precursors as it was originally intended. It was completed following the Iran-Iraq war and was adapted to pesticide formulation, using active ingredients such as malathion. However, several CW imported precursors were stored at this site, including 2-chloro benzaldehyde (used for CS), diisopropylamine (for VX), dimethylamine hydrochloride (for GA), and thiodiglycol (for mustard). Although the pesticide formulation installations at Fallujah 3 were destroyed by coalition bombing, the Iraqis have been working to repair existing equipment and to install new equipment at the site. The capability to produce nerve agents is closely related to the ability to manufacture pesticides, as is outlined in Figure 2-1.

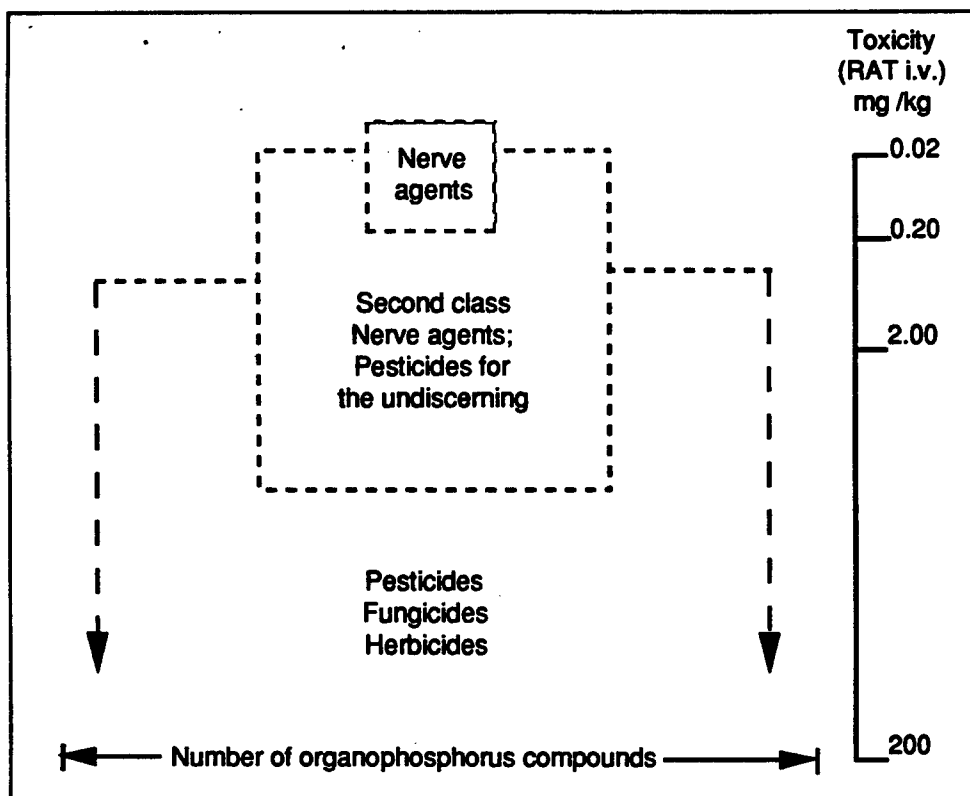


Figure 2-1. Organophosphorus compounds.

Fallujah 1 was the least developed of the three Fallujah sites. Unfinished production facilities were destroyed by bombing. Since the end of the Iran-Iraq war, Fallujah 1 had been used for storage, including for the precursor diisopropylamine. Although Iraq had not declared it, UNSCOM inspectors also found a small quantity of triethylamine (a stabilizer for G agents).

2.2 UNSCOM CHEMICAL WEAPONS INSPECTIONS.

2.2.1 UNSCOM 2.

The purpose of UNSCOM 2, the first CW inspection, was to survey Al Muthanna and to prepare a description to be used in a subsequent full inspection. Special hazards and problems were to be identified. Chemical weapons munitions and filling facilities were to be described and an assessment was to be made regarding the possibility of using the site for CW destruction. Any undeclared items or activities that were discovered (whether related to CW or to other weapons covered by Resolution 687) were to be reported. A brief summary of UNSCOM 2 findings follows:

- A very large number of CW munitions were found, including bombs, artillery shells, mortars and rockets. Over 6,000 declared sarin-filled 122 mm rockets are stored at Al Muthanna.

- UNSCOM 2 first identified the unstable nature of Iraqi sarin, the production method and the GB/GF mixture. The identity and purity of the mix was skeptically regarded until the vapor sample taken from the 122 mm rockets was analyzed at the Chemical & Biological Defence Establishment in the United Kingdom.

- Discussions with Iraqis revealed that CW munitions were not marked, but mistakes were avoided by close control exercised by Muthanna personnel. Munitions were filled on demand and any unused munitions were returned to Muthanna after an offensive, thereby avoiding storage problems associated with the reduced stability of the Iraqi sarin.

- One area of Al Muthanna used to produce sarin (from 1986 to 1988), mustard, and some precursors was heavily damaged by bombing. Inspectors found that major vessels and pipework in the sarin production facility had been removed from the one facility not destroyed by bombing. (The other was claimed to have been destroyed.) The Iraqis claimed the equipment had become unscruigeable, and remained on the plant site.

- Hundreds of tonnes of chemical precursors for agents were present. Many of the weapons and storage containers were leaking and hazardous.

- Two sophisticated, partially underground pilot plants were intact; a third was heavily damaged.

- Safety manuals and other documentation were requested, but none were made available. The site had been stripped of all paperwork.

Problems identified included: how to destroy the remaining agent and chemicals; how to move them safely to the destruction site; need for improving medical backup for the inspection team. There were no glaring discrepancies between the Iraqi declarations and what was found on site. This was not surprising to inspectors, since Iraq had substantial time--at least two months warning beginning with the approval of UN Resolution 687 until the first CW inspection--to remove any agent, documentation, or equipment that they wished to conceal.

2.2.2 UNSCOM 9.

The primary purpose of UNSCOM 9, the second CW inspection, was to conduct a detailed inspection of three chemical production facilities in the Fallujah area 40 km south of Al Muthanna. Two additional tasks were added: the inspection of three pilot plants at Al Muthanna that the Iraqis were suggesting be used for CW destruction, and of the CW storage site at Tammuz airbase (also referred to as Al Takhadam airbase).

The inspection team found that the Iraqi declarations regarding the Fallujah sites were essentially accurate. CW were not produced there. Some precursors were manufactured in small quantities, and several types of precursors were stored.

One irregularity discovered by UNSCOM 9 was the removal by Iraqis, prior to the inspection, of an undamaged scrubber unit from Fallujah 3 for use at Fallujah 2. Attempts had been made to camouflage where the scrubber had been at Fallujah 3 with debris.

Regarding the Al Muthanna pilot plants, the inspectors concluded that two of them could be used for destruction of some CW agents, if the facilities were modified. The plants were fairly new, had excellent equipment and high standards of safety and design. The third had been damaged and was hazardous.

At Tammuz air base, inspectors verified the Iraqi declaration that 200 mustard bombs were stored on the site. Other bombs, presumably high explosive (HE), were also there, though not closely inspected. Because Iraq generally does not physically distinguish its chemical from other munitions, it was not verified that the other bombs were HE and not CW-filled.

2.2.3 UNSCOM 11.

UNSCOM 11, the third CW inspection, was designed to visit a minimum of two sites at which chemical munitions had been declared to be stored and one undeclared site, Fallujah General Headquarters. No chemical weapons were found at the latter site, although protective equipment and riot control agent (CS) were present. Most of the riot control devices apparently, according to their markings, had been looted from Kuwait. At other locations, however, Iraq had large quantities of indigenously produced and weaponized CS.

At one declared site, Dujayl, the team inspected 30 declared Al Hussein missile warheads lying in an orchard containing nerve agent, according to Iraq. Some appeared to be binary weapons because they were filled only with alcohols, and jerry cans of DF were nearby. The team instructed that the missiles and chemicals be removed to Al Muthanna for destruction.

A subgroup of the team visited a storage site at Al-Mutasim airfield, near Al Bakr airbase. The purpose was to verify the presence of 160 declared bombs containing mustard. Four of the bombs had burst; others were overpressurized. The team instructed that these bombs also be removed to Al Muthanna.

A portion of Al Taji, a site which had been declared in conjunction with ballistic missiles but not CW, was also inspected. The team discovered an estimated 6,000 undeclared nerve-agent containers for 122 mm rockets that were either unfilled or rejected. Instructions were issued that they be destroyed. Documentation regarding the nerve agent containers was requested, but the Iraqis responded that it was unavailable. They said that some of the paperwork had been looted, despite the fact that the facility in question was heavily guarded.

Iraq had declared 6,394 mustard-filled artillery shells at the chemical proving ground at Fallujah. They appeared to be fairly old, perhaps dating from 1984. Although stored in the open, most were in seemingly good condition. At least 100, however, had been exposed to fire, causing them to burst. No rational explanation for the exposure was given, despite repeated questioning.

One discovery at the Fallujah proving ground was markings on a small number of 155 mm projectiles. They were marked with an H (Arabic-language alphabet) for mustard. This indicated to inspectors that some CW munitions are indeed marked, contrary to the practice of non-labeled CW munitions. However, these particular munitions represent an exception; they may have been marked because they are old and in storage, with no officer accompanying them.

A few other storage facilities at the Fallujah site were also examined. No items that should have been declared were found.

Throughout the mission, Iraq declined to provide information requested, such as how many shells and bombs had been imported. In response to a request for documentation on CW missile warheads from the Al Taji site, inspectors again were told that it was not available because some of it had been looted, despite the fact that Al Taji is a heavily

guarded facility. Deliberate false statements were made by Iraqi officials throughout the mission. Some were outrageous, such as the claims that Iraq had not used CW against Iran and that up to half of Iraq's chemical munitions had been expended in testing. Some misinformation--such as erroneous coordinates of sites listed in Iraqi declarations--may have been inadvertent.

2.2.4 UNSCOM 12.

The fourth CW inspection, UNSCOM 12, was sent to supervise the destruction of unfilled munitions and to collect information on sites where CW agent and precursors could be collected and destroyed. Over 8,000 shells, aerial bombs, and rocket warheads were crushed by a bulldozer or cut by blow torches. Also, four possible destruction sites for chemicals were selected.

There was an accident during the mission. Rocket warheads believed to have been drained of agent were spot-checked with a chemical agent monitor. They were then crushed. The following morning, a rocket containing agent burst, seriously injuring one Iraqi.

A disagreement arose between the team and the Iraqis over whether dies for making bombs should be destroyed. Iraq claimed that they were dual-use--usable for manufacturing conventional munitions--and therefore were not subject to Resolution 687. The team designated the equipment for destruction by a later mission. The general criteria for destruction of dual-use equipment is that if it had been used to produce proscribed equipment, it should be destroyed, despite potential legitimate uses.

2.2.5 UNSCOM 17.

UNSCOM 17, the fifth CW mission, cataloged the munitions, agent, chemicals, and equipment to be destroyed at Al Muthanna. The mustard agent was found to be 90% pure. Iraqi declarations regarding munitions were found to be generally accurate. However, there was considerably less (25%) bulk mustard agent present than had been declared. Iraq had declared 280 tonnes of mustard, but only 205 were found by the team. Iraq explained away the discrepancy by saying that an error had been made in the declaration. Also, the amount of phosphorous trichloride present was about 35% less than had been declared. The team counted over 12,000 munitions, and randomly sampled a few munitions and containers of bulk agent.

Evidence of s-butyl sarin was discovered on site, but had not been declared by Iraq. Iraq first attempted to deny its presence, but subsequently explained the presence of traces by declaring that there had been some unsuccessful experimentation in the past.

Traces of two additional G-agents (n-butylsarin and ethylsarin) were found by the team. Iraqi officials denied making or possessing these G-agents and questioned the validity of the team's sampling and analysis.

The UNSCOM 17 team learned that the 2-cubic-meter aluminum Scud propellant storage containers that have frequently been used by Iraq to store nerve agent also may have been used to store mustard. When traces of mustard were found in a container of sarin, the Iraqis explained that they did not decontaminate between emptying one type of agent and filling with another. It is not known whether this is true.

2.2.6 UNSCOM 20.

The sixth CW inspection, UNSCOM 20, was assigned the task of examining six declared CW sites. The first, Saddam airbase, was the storage site for Iraqi 250-gauge and 500-gauge mustard-filled bombs. They were stored in the open, although storage buildings were clearly available. The bombs were in good condition and could be moved elsewhere for destruction.

Al Tuz airfield near Kirkuk also stored the same types of bombs in the open. Initially they were judged to be in too poor of a condition to be moved; later they were moved, however, without problems. The same types of bombs were also stored at Qadisiyah airbase 190 km west of Baghdad.

Khamisiyah storage site near Nasiriyah was the site of storage for mustard-filled artillery shells and rockets filled with a mixture of GB and GF. The rockets were damaged by Iraqi demolition efforts, although Iraq claimed that the damage was caused by U.S. ground forces during Desert Storm.

Al Walid airbase stored binary CW. The R-400 bombs containing only mixed alcohols were in good condition and non-hazardous. They could be moved.

Muhammadiyah ammunition depot, 150 km west of Baghdad, stored CW. The site was bombed so heavily that a full inspection was not possible. There were many CW munitions, both damaged and in good condition. In the inspectors' opinion, the Iraqis began destruction of chemical weapons at this site after the war. However, the Iraqis

explained that all the destruction had occurred during the war. The evidence discovered by the team did not support the Iraqi explanation. The inspectors found separate stocks of burnt mustard bombs behind warehouses and inside structures which had suffered no fire damage. Declared filling equipment was also destroyed but not in the building in which it was inspected. Inspectors did not find many of the DB-2 bombs which had been declared. Also, inspectors found a new type of CW spray-tank device that had previously not been declared, thus begging the question of how many other devices or quantities of munitions have not been declared.

Inspectors ran into a number of obstacles with the Iraqis, particularly refusal to provide information. Iraq did not reveal the number of unfilled weapons cases imported and would not give adequate details on the new CW device discovered by the inspectors.

2.2.7 UNSCOM 21.

Fourteen undeclared sites were visited during UNSCOM 21 to look for signs of undeclared chemical or biological weapons activity. Also, a test run of destruction of a nerve agent simulant was observed at Al Muthanna. No evidence of chemical or biological weapons production or storage was found.

Three undeclared Scud transporter carriers were discovered at Karbala Storage Facility. Also, equipment for manufacture of 250 and 500 gauge bombs was found at the Mosul Sugar Factory. (The Iraqis had stated during UNSCOM 7 that the equipment had been moved to the sugar factory to avoid damage during the war.) Iraq had previously said that this equipment had been returned to Al Muthanna for destruction. This raised questions not only in terms of Iraqi compliance, but also about where equipment for production of other types of bombs is located.

Two military aircraft with external tanks equipped with spray nozzles were seen at Mosul airfield. Iraq explained that the tanks were for seeding rain clouds, though this is unlikely because the area is generally arid with little agriculture. No samples were taken.

The Iraqis were uncooperative toward UNSCOM 21 and felt that the inspection should not have taken place because the sites were not relevant, in their opinion, to Resolution 687.

2.3 LESSONS RELEVANT TO INSPECTIONS IMPLEMENTATION.

An important distinction must be kept in mind when analyzing the Iraq inspection process for lessons pertinent to a Chemical Weapons Convention (CWC): the UNSCOM missions had a significantly higher degree of access and authority than inspectors will have for either routine or challenge inspections under the CWC. For example, some inspections in Iraq were announced literally minutes before arrival at a site while the UN team was en route in a helicopter. Under the CWC, an inspected party may have at least 24 hours and up to 7 days' notice of a challenge inspection. Additionally, Iraq had no right of refusal to inspections under Resolution 687. UN inspectors in Iraq also had repeated and comprehensive access to sites. This will not be the case under the CWC with the exception of a few sites set for destruction.

An even greater difference is the degree of authority that UNSCOM inspectors had versus what CWC inspectors will have. The UN inspections were acting to fulfill a UN Resolution requiring identification and destruction of Iraqi nuclear, chemical, biological, and missile capabilities. Furthermore, Iraq had been defeated in war and faced the threat of new military strikes if it did not comply with the requests of inspectors.

There are several lessons from UNSCOM relevant to the implementation of the CWC. Key conclusions regarding inspections implementation are detailed below.

2.3.1 Inspection Team Selection.

2.3.1.1 Leadership and managerial capabilities are paramount for a team chief. While it is very important for a team leader to be technically credible, it is essential that he or she have strong leadership qualities. Other team members may compensate for a leader's technical deficiencies, but cannot do so for inadequate leadership.

There are several special challenges that are faced by the team leader on an inspection. Within the team, other members are likely to be well-educated individuals who are accustomed to positions of authority; a weak team leader will be unable to provide cohesion. Team members are likely to be subjected to difficult physical and psychological conditions, including adverse weather, hostility from representatives of the inspected country, and possible problems with food or housing. Pressures on the inspectors come from a variety of other circumstances as well, such as when a task must be completed within very short time constraints or the leader is unable to communicate

complete information due to eavesdropping by inspectees. Despite these near-continuous challenges, the leader must keep up morale and focus peoples' minds on their jobs.

As the UNSCOM process evolved, leaders became more comfortable with what was allowed, and what was not allowed during an inspection. Nevertheless, leaders' interpretations of the limits continued to vary greatly. At least two inspectors noted that most U.S. and British inspectors were seen by the Iraqis as having a broad interpretation of the inspection limits, and thus were increasingly "unpopular" with the Iraqis.² Thus, in the context of a future CWC verification regime, selecting a team leader who will be rigorous may be important, regardless of how well the guidelines for inspection are outlined.

The team leader has the ability to be strong and persistent, particularly in the face of stonewalling by the inspectee. Yet, the team leader must also have the sensitivity to know when it is useful to allow the inspectee to "save face". Individuals who are culturally or psychologically unable to put pressure on the inspectee should not be chosen as leaders.

2.3.1.2 Rigorous physical, psychological, and technical requirements should be met by all team participants. Inspectors repeatedly made the point, "First-rate equipment will not make up for second-rate inspectors." Some inspectors were neither physically nor psychologically suited for the tough climate, or the difficult mental tasks of dealing with an unwilling inspectee. They faded in performance over the long duration of the inspections. Also, some members were not sufficiently technically competent to contribute meaningfully.

2.3.1.3 All team members should be able to speak and write in a common language. A common language among team members is critical. The team chief, in particular, should be absolutely fluent in the team's working language. If a member of the team is unable to speak the *lingua franca* of the other inspectors, he or she will be essentially left out, unable to obtain information updates that would help in job performance, or give feedback that would enable the team to do a better job. Also, when it comes to writing the report, the member will be unable to contribute, or effectively react to what is written.

²In retrospect, the Iraqi demand, in July 1992, that the leader of a team be from a country other than those which participated in the Desert Storm coalition is not surprising.

Differences in standards and technical experience among inspectors may manifest themselves as language problems. For example, one Eastern European inspector described something as "highly sophisticated," whereas his colleagues from the West found the item to be mundane. Conversely, a Western inspector may examine a piece of equipment and describe it as not useful for production of chemical agent, whereas an inspector from a developing country who is used to working with lesser equipment, in innovative ways, may immediately acknowledge its usefulness to manufacture agent.

2.3.1.4 Team composition should be predetermined. The majority of inspectors interviewed stressed the point that teams should be preselected--that is, chosen well in advance of a potential inspection--not chosen *ad hoc*, even on challenge inspections. Team composition will, of course, be dependent on the mix of skills required for the site to be visited. Nevertheless, preselecting teams to the extent feasible can help avoid coordination and acclimation problems. For example, some less-developed countries have communications difficulties (such as facsimile machines that work only intermittently), so they may be unable to dispatch inspectors in a timely manner. Also, some countries, particularly the United States, can be very slow to determine which experts might be available at a given time.

Another reason for preselecting teams is to allow them to establish relationships and group dynamic. When a team is first put together, members spend time determining intra-team hierarchical relationships and allocating tasks among the various experts. A team that has worked together before saves valuable adjustment time.

2.3.1.5 A core group of inspectors should be used in repeated visits to a given country or set of sites. Having a core group of inspectors can be very important during repeated inspections of a given country, or in repeated inspections of a site or a set of sites. The corporate memory of such a core group can better detect differences in a facility, (e.g.; movement of a piece of equipment from one site to another), and any other key changes that may have taken place between inspections.

As was proven during the Iraq inspections, a core group also helps prevent the inspected country from playing one team against another. In instances where there was not overlap in team memberships, the Iraqis often confused and embarrassed inspectors by claiming to have already revealed particular information to a preceding team.

Even though teams should be preselected, and in many cases have a core group, a certain proportion of the members should be rotated regularly. Obviously, if expertise for

a specific or uncommon task is required during a given inspection--such as personnel to find and dispose of unexploded ordnance--new members will be placed on the team. Rotating some inspectors is particularly important if multiple inspections of the same site are likely. Inspectors develop a stake in reconfirming what they think they saw previously. Thus, if they first reported that a building on a site could only be used for non-weapons purposes, they may not want to change that evaluation even if they are presented with contradicting data. Also, new inspectors are more likely to challenge the established standard operating procedures.

2.3.1.6 Technical capabilities, not country-of-origin, should be the principal criterion for team member selection. Politics can be very detrimental to selection of team members. There were occasions in the UNSCOM process when individuals were selected because of their country-of-origin, not their capabilities. Some of the factors which influenced team selection were: an inclination toward non-U.S. personnel to avoid the appearance that UNSCOM was a U.S. campaign against Iraq; a predisposition toward placing some non-Western representatives on teams to stress the multinationality of the exercise and a desire for some nations to participate as a matter of prestige. Such representation was sought despite the fact that better-qualified inspectors were available from some Western countries.

Politics in the team-selection process may prove to be a challenge to future inspection teams because specialized training and experience will be essential to chemical verification. Some inspectors who participated in the UNSCOM inspections feel strongly that people who have degrees in chemical engineering, but who are academics, for example, probably will be unable to detect agent production activities. Signs of illicit activity are likely to be subtle and unobservable to anyone without experience in chemical-agent-related activities. This means that the most capable inspectors will usually be from developed countries, particularly countries with in-depth experience in agent production and/or chemical-weapons-related detection and defense.

2.3.1.7 Team size should be as small as practical. The team size must be determined by the mission, but generally it should be as small as practical to accomplish the goals. This will minimize logistics problems and facilitate intra-team coordination and communication. Command and control is more difficult for larger teams and must be predetermined, and not left for team leaders to organize on arrival.

A large team may be important in cases when:

- there is little or no good intelligence about the site to be inspected;
- non-chemical-weapons-related expertise (e.g., explosive ordnance disposal) is required;
- a large or complex site has to be inspected in a very short period of time; or,
- special circumstances require additional personnel, such as when perimeters must be secured.

2.3.1.8 Nations may seek to have representatives on teams for purposes of conducting espionage. Some countries in the future may attempt to get representation on teams that will be going to a particular country because they intend to use the inspection process to conduct industrial or military espionage. There were representatives on some UNSCOM missions who were perceived to be more concerned with gathering information on U.S. conventional weapons capabilities (e.g., examining bomb damage) and on chemical weapons issues than on Iraqi activities. Inspectors whose priority is espionage may not contribute to the job at hand. Also, their activities run the risk of causing incidents from which the inspected country can conclude that the inspection is being misused.

The participation of intelligence personnel on a team is not meant to refer to those who are experts on the sites to be visited, or on the programs being targeted for inspection. Most CW and BW inspectors expressed high regard for intelligence agencies' representatives serving on the teams (though this view was not always shared by inspectors in the nuclear and missile teams, or in the Special Commission itself).

2.3.2 Team Behavior.

2.3.2.1 Western inspectors tend to mirror-image, inhibiting assessment of how non-Western countries might use equipment or facilities for illicit purposes. Western inspectors tend to mirror-image, thinking that less developed countries will have the same objectives and procedures as they would. This is wrong. For example, Iraq could be satisfied to use unlined reactors to make chemical agent and discard them when they corrode, whereas a western country would find this inefficient. Iraq produced the nerve agent GB/GF with a high HF content, yet this was sufficient for their purposes because of the Iraqi fill-before-use policy. The United States program historically has demanded high purity to enable extended shelf-life.

Countries may be willing to devote enormous resources for seemingly unreasonable goals. Examples are Iraq's pursuit of binary nerve agent and their efforts to make teflon

liners for missile warheads as compensation for low-grade nerve agent. Thus, there may be factors driving decision-making that have nothing to do with safety, efficiency, or economics.

The Iraq CW inspections revealed that countries may use very lax safety standards in production of chemical agent and filling of weapons. Some inspectors stressed that this should not be surprising because Iraqi safety and handling techniques are similar to those used by the West in the 1960's. For example, all of the current U.S. CW stockpile was produced before present stringent criteria were introduced.

2.3.2.2 Inspectors may be over-qualified and unwilling to do menial tasks. Many menial tasks were willingly done by overqualified people on the inspection teams because UNSCOM was a highly unusual mission involving significant international attention. Highly qualified inspectors on future routine verification teams may be reluctant to do such tasks, which could slow the effort and cause dissension. It may become necessary to rely on trained CWC inspectors with less, or rather appropriate, experience than some of the UNSCOM experts.

2.3.2.3 Inspection teams may practice "self-censorship" to the detriment of data collection and record-keeping. Some UNSCOM teams had the attitude, primarily inculcated by the team leader, that observation and data-collection by inspectors should be severely limited. For example, some disallowed photography; some prevented team members from asking questions inspecting areas other than those specifically defined by the leader as being related to the role of verifying declarations. In the view of some inspectors, these limitations prevented the fulfillment of a central role of inspections, i.e., to look for any signs of undeclared activity.

2.3.2.4 The inspection process can be tedious, which may make it difficult to attract and to keep good people. The inspection process is often tedious and utilizes the high-level skills of experts only a part of the time. This was true even in the case of the Iraq inspections, which was a high-profile exercise and not at all "routine". For example, inspectors often had long bus rides, extensive periods of waiting, and only short bursts of activity in which their expertise was required. Examples of tedious activities include counting munitions (Iraq possessed over 125,000 filled and unfilled chemical munitions), inventorying equipment, and observing a perimeter for activity.

2.3.3 Implications of Safety Issues.

2.3.3.1 The safety officer should be knowledgeable about chemical agents and munitions. Knowledge in industrial chemistry is not sufficient for a safety officer; the officer must also have sufficient specific knowledge of chemical agents and weapons. In cases where the person responsible for safety was not knowledgeable, he tended to compensate by being overly cautious, which resulted in slowing operations severely or in having recommendations overruled. Overruling a safety officer is not good practice in terms of team confidence and morale, and can be avoided by having the correct person assigned.

The safety officer also plays an important role in dealing with hostile hosts. In addition to assessing the safety of a situation, the safety officer acts to prevent illegitimate safety concerns offered by the host from delaying or detouring an inspection.

2.3.3.2 Having standardized equipment and safety procedures will speed inspections and likely make them safer. Detection equipment and safety gear varied based on the countries providing it. Countries also had varying procedures for safety. Although no country's contribution was necessarily superior, it will be important to standardize in the future. For example, Russian and Czech participants used impermeable protective suits, which allowed them to rigorously and rapidly decontaminate, and therefore undress with less care. UK suits are permeable and less easily decontaminated, making it necessary to have a more careful undressing procedure. UNSCOM 17 was delayed for two days to train Czechs on NATO undressing procedures. Standardizing will reduce the time needed for training and will maximize safety. Decisions must be made on whose equipment is to be used and how strict safety standards are to be.

Initially, UN inspectors depended, to some extent, on Iraqi caution to make safety decisions. For example, they don protective clothing only when the Iraqis did. This proved to be a mistake because Iraq's standards of safety were very poor and their caution almost nil. Inspectors quickly learned to rely on their own monitors and judgment regarding risks. Soon the Iraqis became reliant on the inspection teams to let them know when to take particular care. Thus, it is essential to standardize safety procedures.

In deciding which country's equipment is to be used, it is important to consider the willingness of the supplier country to provide the equipment, and its commitment to maintenance and support. Like many UN operations, supplies and equipment are likely to be donated at the supplier countries' expense.

2.3.3.3 Medical support for inspections must be established. Initially, the medical support system was insufficient to handle any potential emergencies. By UNSCOM 17, a formidable support system had been established. Having such capabilities available for inspections in far-flung locations around the world may be very difficult and expensive. In preparing for the CWC, it will be important to factor these costs into the budget estimates.

2.3.3.4 Suiting up reduces efficiency. Inspectors who had to suit-up in protective gear were unable to perform for very long and were much less efficient. While it is true that protective gear is inhibiting regardless of the climate, the heat in Iraq greatly exacerbated the problem. This is not an issue of standardized equipment; it is a factor to be considered in establishing the time required for performing a given portion of an inspection. When gear had to be worn in Iraq, substantially more time was needed. In hot desert conditions, inspectors may be constrained to no more than 15 minutes in a toxic area because of the debilitating effects of protective equipment.

2.3.3.5 Use of bottled air will require more time and will be enervating. Extra time is also required when bottled air is necessary, such as in inspections of some bunkers. Not only is the inspector limited by the length of time that the air will last, but also by the burden of carrying 15 kilos, requiring the inspectors who undertake such tasks to be physically fit. The question of bottled air is also important in the context of resupply; either the team must carry its own, or be unduly dependent upon a potentially hostile host. Some inspectors said they would not want to serve on a team that depended on the host for supplies which could be sabotaged.

One expert suggested that the use of an air hose system might be preferable. However, this system has inherent limitations. First, an air hose system still requires the inspector to wear a back-up air tank, though smaller, in the event of air hose failure. Second, the air hose connections limit the speed and distance an inspector can move. Finally, the logistics support to an air hose system is far more cumbersome than bottled air, requiring a generator, a remote air filtration system, and support personnel.

2.3.4 Logistics and Related Issues.

2.3.4.1 Customs services in foreign countries can be culturally so different that they constitute substantial roadblocks to timely, effective inspections. Customs services in several Arabic countries were time-consuming. Checking incoming equipment was slowed by unplanned delays. Unless points of entry are ready to accept unusual

equipment quickly, this may be a continuing problem, particularly in less developed countries.

Special customs procedures may be necessary for future inspections. Some equipment may be prohibited for use in some countries by export controls for use in volatile regions. For example, the Hewlett-Packard computer associated with sampling analysis equipment used in Bahrain was an item restricted for export by the United States. An exception had to be made to allow its use in the Middle East.

2.3.4.2 Commercial air travel may suffice for routine inspections, but an on-demand transport capability will be necessary for special or challenge inspections. Export controls and international safety regulations can delay or prohibit the international transport of chemicals and equipment. Special arrangements will need to be made to allow the transport of samples of suspect chemical agents for off-site analysis. For example, it was necessary to use German military aircraft to transport samples because regulations on commercial airlines prohibit carrying potentially dangerous substances.

On-demand transport will be necessary for special or challenge inspections primarily because they must be conducted with haste. Another important reason is that non-routine inspections probably will require transport of large amounts of equipment and possibly large numbers of inspectors and support personnel. One inspector estimated that only one or two aircraft need be continuously available; a CWC aircraft fleet would be unnecessary. Others felt that additional aircraft would be required, if there are to be multiple simultaneous challenge inspections.

2.3.4.3 Splitting a team for more efficient inspection can be hampered by insufficient support personnel. Insufficient support resources can prevent a team from completing its tasks on time, or perhaps even from undertaking important additional inspections. On occasions when it would have been efficient to break up the team into sub-units to cover a large site or multiple sites, it was not always possible. Limiting factors included lack of translators, transportation, drivers, and equipment (e.g., decontamination capabilities).

Lack of translators available for rapid reading of documentation could result in missed opportunities to visit key sites or to interview crucial personnel. Although this did not become a problem in the chemical inspections because most of the documentation was removed or destroyed, it could be a critical factor in future CWC-related inspections.

Some inspectors felt that it was important to have two translators assigned to the team chief. One could focus on the main discussion and the second could attend to the background conversations and asides. Also, if one tired, the other could take over.

2.3.5 Sampling and Analysis.

2.3.5.1 Cost of equipment and transport may be an important consideration, depending on the number of routine and challenge inspections. Gas chromatographs, a mass selective detector, and a spectrometer (FT/IR) were used in the laboratory in Bahrain, and ranged in price from \$25,200 to \$31,500 per piece of equipment. These and other equipment used in sample analysis will already be in the possession of the national laboratories likely to be called upon for analytical services. If countries were to insist on setting up an independent international laboratory, however, these and other expenses would be incurred.

The costs for equipment for on-site analysis are impossible to determine precisely because the number of inspections that will be required under the CWC is not known. However, the cost of equipment used in Iraq is instructive. It is worth noting that some analytical equipment, particularly a mass spectrometer, could cost as much as \$500,000. While not used by UNSCOM, they are planned for use under the CWC.

The total cost of all the equipment supplied by the United Kingdom was about \$234,000, of which \$43,000 represented 12 chemical agent monitors. Thus, the analytical equipment and supporting laboratory hardware from the UK was about \$191,000. The UK equipment was supplemented with supplies provided by Finland. The Finnish equipment costs for UNSCOM 17, for example, totaled \$112,738.

Most of the items were returned to the United Kingdom and Finland at the end of the inspections. Many of the equipment costs will be non-recurring costs, though general wear and maintenance, and potential tampering and destruction will increase costs.

Costs of running the two laboratories at Bahrain and Muthanna were estimated at about \$180,000 per week. However, it is clear that if sampling analysis were to be done on site (as recommended by several inspectors), it will be much more expensive than depending on national laboratories.

Transporting the equipment for samples analysis anywhere in the world can be done with one week's notice, less if pre-packaged laboratories and UN transport aircraft are ready and waiting. Approximately two tonnes of equipment were shipped to Bahrain

from the United Kingdom to provide support to the UNSCOM CW teams. It was packed in 33 crates and placed on one flight, occupying about 3,000 cubic feet. The cost of transport to Bahrain was \$7,380 plus whatever costs were incurred in forwarding equipment to Baghdad, Muthanna, and the subsequent return to the United Kingdom. The Finnish equipment which supplemented that of the UK totaled just over one tonne. The shipment costs for these items are not available.

Despite the relative mobility of the analytical lab, there were limitations. For example, some electronic detectors would be prohibited in areas containing munitions, and lack of equipment availability prevented the team from subdividing.

2.3.5.2 Equipment should be on hand to conduct real-time sampling analysis. Several inspectors felt that sampling analysis equipment must be on site to provide real-time feedback to inspectors. Doing so would have the added advantage of avoiding the problems associated with transportation of samples (i.e., refusal by civilian airlines to carry toxic substances and maintenance of an audit trail). Inspectors had to wait up to seven days after taking samples for results of analysis because samples had to be transported to Bahrain. Quick turnaround is crucial to completing an inspection in a timely manner. Also, chemical evidence may degrade with time, making rapid results of sampling analysis vital to detection of cheating.

2.3.5.3 Certification of additional labs off-site probably will be required for back-up and intensive analyses. When suspicious samples are found, or when more detailed analyses are required, it will be necessary to send the samples to a laboratory with extensive capabilities and experience. Inspectors interviewed believe that a multinational laboratory staffed by employees who have no in-depth experience with chemical agents is unlikely to be capable of functioning effectively. (Inspectors or representatives from non-industrialized countries may disagree for several reasons, including fear that use of national laboratories will allow developed countries to control the analysis and, perhaps, manipulate the findings.)

Interviewees also argued that a multinational laboratory will be an unnecessary expense. Existing laboratories in Canada, the United Kingdom, the United States, or the Netherlands have the established reputations, experience, and existing capabilities needed. The problem will be if the inspected country declares that the results are tainted because of the political predisposition of the country in which the laboratory is located. Regardless of the truth to such an accusation, it will become more difficult to "convict" a

country that declares the evidence to have been subject to tampering or political interpretations.

A "forensic trail" concept should be instituted to demonstrate that every stage in the transportation and analysis of samples is conducted without tampering. In addition, triplicate sampling enables the country to retain a sample and allows two samples to be analyzed independently.

2.3.5.4 Analytical equipment must be guarded against both tampering and mistakes.

Taking analytical equipment on site poses some dangers both in terms of potential tampering and mistakes due to ignorance. For example, equipment was turned upside down by handlers in Bahrain, which could have seriously damaged it, but did not. Given that equipment is expensive and cannot be replaced quickly, there is potential for purposeful or accidental elimination of on-site sampling and analysis capability.

2.3.5.5 Traces of agent may be found even when no agent has been purposefully manufactured. There is the potential that legitimate samples may contain traces of agent, although no agent had been purposefully manufactured. The detection of trace quantities must be confirmed independently. Because (1) traces of agent or precursors may be produced inadvertently or may exist in the natural background, and (2) the extreme sensitivity of modern analysis equipment (i.e., detection thresholds of a few parts per trillion) may detect traces that were previously below detection thresholds, the presence of trace quantities of agent or precursors does not necessarily indicate CW presence. Confirmation may require collecting new samples, analyzing other samples, and/or comparison to other findings from an inspection.

A related point is that samples taken from one site may indicate presence of an agent which, purportedly, is not manufactured or stored on that site, but was transported there. This happened in the case of Iraq. A sample taken indicated presence of an agent. Iraq stated that the chemical compound was found in the sample because decontaminant, not the detected agent, was moved from site to site.

2.3.5.6 Perimeter monitoring and downwind sensing is very likely to be useless.

Downwind sampling did not reveal evidence of chemical agent, even in areas known to have leaking chemical munitions. The use of a chemical agent monitor (CAM) and an AP2C failed to detect agent downwind from leaking mustard containers. More sensitive downwind sensors may reveal evidence of chemical agent, but are likely to be subject to a high rate of false positives.

2.3.5.7 Detection equipment may not be able to distinguish liquid from solid fill. Two pieces of equipment were used in UNSCOM 20 to differentiate between liquid and solid-filled munitions. At Qadisiyah airbase, mustard bombs were examined with Acoustical Resonance Spectroscopy (ARS) and Ultrasonic Pulse Echo (UPE) systems. UPE did not indicate that a liquid was present and ARS indicated that the fill was solid. Sampling revealed only liquid mustard, though the mustard inside had separated into strata which gave a false reading to both systems.

2.3.6 Technical Secretariat.

2.3.6.1 Some inspectors felt that the political nature of the UN inhibited smooth, efficient inspections. The UNSCOM experience is one in which diplomats and "people from the policy side" were in charge of the inspection process. In the view of some inspectors, having additional people with operational and military experience in decision-making positions could have facilitated speedy and efficient handling of the inspections' organization and implementation.

2.3.7 The Role of Intelligence.

2.3.7.1 The quality of national intelligence determined whether hidden assets or capabilities were found. Without excellent intelligence, the teams could not pinpoint suspect facility locations or equipment to be inspected. The best example of a successful mission was IAEA 6/UNSCOM 16, which acquired details on the Iraqi nuclear weapons program. The information that enabled the inspection came from a defector. In cases where the intelligence was inaccurate or misleading, inspectors looked foolish and the Iraqis obtained insights on the limitations of intelligence-gathering in the West.

2.3.7.2 Intelligence gathering and dissemination from one or a few countries may limit the effectiveness of inspections. At the outset of the inspections process, the UNSCOM intelligence briefings tended to exclude representatives of some countries. This caused morale problems, so increasing intelligence was shared more broadly. This trend indicates that, in the future, intelligence data provided will be made available to all countries participating in the inspection process. In the opinion of some, this has whetted the appetite of the international community to obtain more extensive intelligence data and not to depend on the United States or other Western countries exclusively.

Intelligence information was provided primarily by the United States, especially overhead imagery. Some inspectors opined that U.S.-supplied intelligence dominated

decisions on the sites to be inspected and, perhaps, excluded valuable data from other countries. (This view was contested by several inspectors.) U.S. and Western dominance meant that there were few contests over which information was most accurate. It also meant that potentially valuable information from other sources was overlooked. Some inspectors noted the movement toward establishing an independent or multilateral gathering and analysis capability. The expansion of the number of countries providing and/or interpreting intelligence must be tempered by the possible provision of intentional disinformation--which could slow or derail the inspection process.

2.3.7.3 Declarations may be based on assumptions by the inspectee regarding Western intelligence-gathering capabilities. Initially, Iraq appeared to assume that Western intelligence-gathering mechanisms and procedures were more capable than they actually were. Some Iraqis made comments to inspectors that satellites could read license plates and repeatedly marveled at the line-drawings of facilities provided by Western intelligence agencies to the inspectors. Inspectors who heard such remarks speculated that the Iraqis probably declared more than they otherwise would have out of fear that the inspectors already knew about some items. In particular, Iraqis appeared to assume that Western intelligence agencies would know about anything that could be physically seen outdoors.

2.3.7.4 As inspections progress, an inspected country will become increasingly educated on the limitations of Western intelligence. Iraq learned much about the limitations of Western intelligence-gathering during the inspections. Iraqi officials were amused and somewhat smug about inspections of sites that were unrelated to weapons production or storage. As one inspector noted, "The inspection of a bakery and a jail house clearly showed Iraq that we don't know as much as we'd like to know." The Iraqis also know which undeclared sites have gone without inspection and can factor this into future deceptive practices. The Iraqis also learned that dummy structures did not always fool Western intelligence; at one site, no dummy bunkers were bombed, while only real bunkers were.

2.3.7.5 Careless or untrained inspectors can give away valuable information on inspection intentions. Iraq eavesdropped on inspectors to learn their intentions and conclusions. Some inspectors tended to be cavalier about intelligence information and frequently tipped the Iraqis off about inspection plans. Communications to inspectors already in-country from New York and Bahrain also gave opportunity for leaks.

2.3.8 Declarations.

2.3.8.1 Declarations may be false or incomplete. Iraq was purposeful in using declarations to manipulate the UNSCOM process. Iraq's first chemical weapons declaration was on 18 April 1991. Corrections and additions were made in letters on May 16 and 22, 1991; July 18 and 20, 1991; November 19, 1991; information transmittals January 27-30, 1992; and a letter of March 19, 1992. Alterations were significant; in July 1991, Iraq admitted it had 46,000 chemical-filled munitions--over four times the amount in the original declaration.

As mentioned previously (sec. 2.2.5), Iraq had overdeclared several items. Overdeclarations may be errors as Iraq claimed. However, Iraq may have been unprepared and began moving or concealing agent and munitions only after an initial declaration. Whether accidentally or intentionally, Iraq made incorrect declarations with impunity.

2.3.8.2 Declarations may be limited to the information that the inspectee knows is already in the hands of the inspectors. Iraqi chemical weapons declarations initially were incomplete and unsatisfactory. Successive amendments improved the accounting, but errors and omissions continue to be found. It is clear that Iraq intended to divulge as little information as it could, largely submitting data consistent with what has appeared in the Western press and which is assumed to be known by Western intelligence (e.g., from bomb targets).

2.3.8.3 Making declarations may not be a well-understood process in countries inexperienced with arms control compliance. Some inspectors noted their opinion that discrepancies in declarations cannot always be attributed to intentional cheating. Inadvertent noncompliance could also be due to several factors, including lack of understanding of the declarations process, deficient record-keeping, and apparent absence of a centralized database on equipment and materials. Some discrepancies also could have been due to chemical losses from corroded tanks and spillage, and equipment believed to have been destroyed during Desert Storm.

2.3.8.4 Non-declarations may be important, but unintentional. There may be cases in which declarations omit something important, but the country in question may not intend to misrepresent the facts. UNSCOM sampling and analysis with a mass spectrometer revealed that Iraq had produced secondary butyl sarin, although GF, GB, and VX were the only nerve agents that had been listed in Iraqi declarations. Only after the discovery

and subsequent questioning, did the Iraqis reveal that it had been produced. They claimed that it had been produced only in small quantities at the level of research. It appeared to some inspectors to be a genuine instance of forgetfulness.

2.3.8.5 Verifying declarations can be very time-consuming, thus limiting the time available to detect undeclared activities. Verifying Iraqi declarations was often very difficult. Almost all chemical munitions were unmarked, so it was not possible to tell from appearance whether they contained chemicals. Sampling ports on chemical tanks were corroded, making access time-consuming. The very size of the facility at Al Muthanna made checking declarations a lengthy exercise; it took seven weeks with inspectors working six-day weeks to confirm the declarations.

2.3.8.6 The inspected country may consider its verbal amendments to declarations as having the same status as the initial written declarations. As items were found or as Iraq decided to add to its initial declaration, Iraqi officials frequently made verbal amendments. They considered these to have as much weight as initial declarations. It is possible that the amendments were due to afterthought, or were attempts to mete out information and confuse the verification process. In the future, a standard policy must be adopted to deal with "after-the-fact" verbal admissions.

If declarations are made in multiple languages, there may be discrepancies, accidentally or purposefully made to confuse inspectors. This happened in at least one case when Iraq made declarations in Arabic that contradicted those made in English.

2.4 LESSONS REGARDING ABILITY TO DETECT NONCOMPLIANCE.

Iraq undertook a variety of camouflage, concealment, and deception activities to prevent the detection of its weapons programs. During the inspection process, Iraq inspectees continually attempted to delay and derail verification and destruction processes. Some of the means used to defeat detection and verification of Iraqi chemical capabilities are outlined below.

2.4.1 Inspectee Control of Information.

2.4.1.1 The inspected country may limit information by allowing only a limited set of people to interact with inspectors. Iraqis interacting with the inspectors were obviously briefed on what they could and could not say, and Iraqi videotaping of all aspects of the inspections helped guarantee that Iraqis stayed within their instructions. The inspectors

dealt with the same set of Iraqis repeatedly; no access to other personnel involved in the weapons programs was allowed. This meant that the Iraqis had good corporate memory on what had or had not been revealed.

There was no way to gain access to the personnel who worked at the facilities outside of the limited set of officials that the Iraqi Government chose as intermediaries. For example, it is estimated that 500 people worked at the Muthanna state establishment during pre-war operations. Only a dozen of the top personnel were ever seen by inspectors. At least one person who was presented as a top-level manager was believed to be a ringer by several of the inspectors. The "manager" was unable to address many of the questions asked by the inspectors that any person in his position should have known.

2.4.1.2 Videotaping by the inspected country can result in reticence by its own personnel in discussions with inspectors. Constant Iraqi videotaping was intimidating to some inspectees. There was no doubt in inspectors' minds that the videos were used not only to record what the UNSCOM team was doing, but also to record responses and information given by Iraqis. This information could then be used for training and for critiquing the performance of inspectees. Iraqi intimidation of its personnel may have been drastic; for example, several inspectors felt certain that an Iraqi who had made a mistake had been executed.

2.4.1.3 Documentation can be destroyed or removed. Documentation on chemical purchases, product runs, and a variety of other functions was expected to be on-site at a chemical agent production facility. However, there was no such paperwork and the Iraqis denied keeping such records. At one site, piles of burned papers and empty file cabinets indicated that the evidence was probably destroyed and/or removed. Removing paperwork would require only a short time; Iraq had months in which to remove it prior to the onset of inspections. The lack of documentation is a combined result of destruction during the war from bombing, destruction or removal after the war by Iraq, or failure to keep records. Several inspectors noted that it would have been very difficult for Iraq to manufacture agent without adequate record keeping.

2.4.1.4 Nothing may be labeled. Verifying declarations, short-notice inspections, and destruction of weaponry were all made more difficult and time-consuming by the fact that Iraq did not physically distinguish most of its chemical munitions, and did not label all containers of bulk chemicals. Inspections would be further slowed if containers were mislabeled.

2.4.2 Concealment and Removal.

2.4.2.1 Equipment may be removed before inspectors arrive. Some may be stored in unlikely places. Most chemical weapons production equipment at Al Muthanna had either been destroyed or removed. In many cases, buildings were destroyed by bombing and could not be entered for inspection for safety reasons. Thus, there was no way to confirm that equipment that had been in them had not been removed before the war. A few inspectors hypothesized that Iraq could have removed agent and equipment prior to January 17, 1991 to prevent their destruction in the expected bombing raids.

In some cases, it is known with certainty that Iraq removed equipment to keep it safe from bombing; some was removed to a sugar factory at Mosul. In other cases, it appears that Iraq removed equipment to hide it from inspectors. Iraq sought to obscure its activities by removal of evidence such as concrete flooring and defacement of structures.

2.4.2.2 Chemical agent may be removed and hidden. Chemical weapons may also have been hidden. Some Iraqi chemical agent was stored in 2-cubic-meter Scud-rocket-fuel containers. They are skid-mounted and have hooks and eyes for easy transport. Some declared agent was buried in these containers in the desert and would not have been discovered had Iraqis not intentionally revealed them; more still could be buried. Iraqi mustard agent was high-quality and suitable for long-term storage. The nerve agent was poor quality and would not have a long shelf-life. However, mixed alcohols and DF--the components of Iraq's binary agent--could be stored separately in these containers.

2.4.2.3 Clandestine storage can be obfuscated by claims of unilateral destruction. Iraq's letter of March 19, 1992 stated that it had omitted 24,470 chemical munitions and a quantity of precursors from its declarations. It claimed to have unilaterally destroyed them in the summer of 1991. While it was possible to view the remains of munitions, it was not possible to confirm that the precursors had actually been destroyed. This technique also used in other inspections, particularly missile inspections.

2.4.3 Iraqi Techniques to Exploit Teams' Weaknesses.

2.4.3.1 Some inspectors may be targeted for co-optation. Particularly in larger teams, there was a seemingly conscious attempt by Iraqis to break up team cohesion by a series of tactics, including: giving information to some inspectors preferentially; physically separating some inspectors from others and treating them as if they were special; and pointing out to some team members that information had already been provided to others

(thus fostering a sense among some inspectors that information was being withheld by their colleagues). In at least one instance, some inspectors felt that a team leader was successfully co-opted into being relatively pro-Iraqi, thus being less rigorous in the inspection process.

2.4.3.2 Lack of corporate memory from one inspection team to the next can be exploited.

Inspection teams were also "played off" one against the other by the Iraqis, who particularly exploited the lack of continuity across teams. For example, one team would be told that a previous team had already been informed of certain important data. The subsequent team usually had not been debriefed on the findings of its predecessor, so it did not know if the Iraqis were telling the truth. This often had the result that the inspection team did not call attention to the discrepancy or that the issue was not pursued as vigorously as it might have been.

2.4.4 Use of Time Delays and Hazards to Foil Inspections.

2.4.4.1 Delays can be created by the inspected country to expend the time of inspectors.

Time delays were particularly effective in limiting and defeating the goals of the inspections. The Iraqis were aware of how many days each team had to complete its mission and planned accordingly. Breakdowns of transport, delays in shutting down air defenses to allow helicopter movement, and use of circuitous routes are examples. Another artful tactic to consume time was use of the Iraqi culture and spirit of hospitality. Iraqis would pleasantly insist on providing tea or serving lunch, a process which could take hours. They also encouraged tourist trips, which were accepted by some inspection leaders.

2.4.4.2 The process of language translation can be used to consume time. Even when an Iraqi interlocutor knew English well, he or she would often use the translator. In some cases, inspectors were certain that the purpose in doing so was to slow the process.

2.4.4.3 Restrictions on transport can curtail inspections. Availability of transport was used to curtail inspections. Helicopters sometimes were stripped of night-flying equipment, forcing inspections that depended upon them to stop in mid-afternoon in order to return to Baghdad before dark. By delaying the arrival of some transport--such as trucks carrying equipment--start-up of some inspections was delayed.

2.4.4.4 Hazards delay or deter inspections. Explosives, fuses, and other obstacles were placed in the path of inspection teams. This was especially obvious where unexploded

ordnance had been cleared at a site except near bunker entrances. Bomb damage and structural and toxic hazards afforded additional opportunities to frustrate the time schedules and extent of inspections.

2.4.5 Inspections Teach Proliferators.

2.4.5.1 Inspectors' questions provide information that can improve a proliferator's future weapons efforts. Some inspectors felt that Iraq learned a great deal from the inspection process and from talking to individual inspectors. For example, substantial information was conveyed on safety standards and practices. Iraqis learned much about chemical agent monitors, when to use gas masks, and to consume extra fluid while wearing protective clothing. A few inspectors thought that Iraqis learned from the inspectors how to make agent more efficiently; other inspectors disagreed, saying that the Iraqis already knew the so-called efficient routes, but purposely had chosen not to use them.

2.4.5.2 Informal interactions with inspectors from advanced countries can help either the country being inspected, or the countries represented on the inspection team.

Representatives from countries interested in establishing their own clandestine chemical weapons program can learn a great deal from participating in CW inspections such as UNSCOM conducted in Iraq. Some of the information may come through observing how Iraq produced agent (i.e., the processes used and purity required), and some from inspectors who are not sufficiently cautious about sharing their knowledge. In UNSCOM inspections, the information "pumping" was not just from the inspectees; representatives from non-CW countries on the inspection teams also asked many leading questions about how to make chemical weapons.

2.4.5.3 The inspection process can help teach nations how to defeat verification. Nations with representatives on the inspections teams can learn a variety of useful information such as: the likely nature and extent of intelligence from western agencies; the capabilities of detection equipment; limitations of the sampling and analysis process; methods used by the inspected country to successfully delay or foil the inspection; and what inspectors are likely to be looking for and with what tools.

2.4.5.4 Reports on the inspections can be used by countries to learn how better to defeat inspection efforts. The reports written by the inspection teams as well as the documentation taken from Iraq on how to set up its weapons programs will be extremely useful to any country seeking to undertake a covert program for similar weapons. They may reveal or facilitate, for example, what methods are successful in hiding facilities,

how to set up clandestine purchasing networks, and how to defeat inspections. Such documents are impossible to protect in the UN environment. Given that the CWC implementation will be conducted in the UN environment, it is important that mechanisms and procedures be developed to help control information, and for plans to be made in the event that the inspection process actually facilitates proliferation and cheating.

Observing the types of intelligence available to inspectors is also instructive to a potential proliferator. From the UNSCOM process, the limitations of photography and other intelligence-gathering tools will be made more transparent. Some of the lessons learned by a proliferant country may be that observable security draws attention to a site; clustering facilities can add to their vulnerability to detection; weapons and bulk agent can be hidden; and importation of equipment and materials increases observability.

2.5 CONCLUSION.

Iraq tried to camouflage and conceal its chemical weapons program and capabilities. Although it was unable to prevent the bombing and significant damage of Al Muthanna and Fallujah facilities, Iraq was able to conceal much information about its CW program prior to the UNSCOM inspections. For example, Western intelligence agencies were unable to determine which chemical agents were in Iraq's inventory and were unaware of the delivery systems Iraq had tested (including ballistic missile CW warheads). UNSCOM missions were successful in answering many of the questions about Iraqi chemical capabilities.

Before and during the inspection process, Iraq attempted to preserve key components of its chemical program and prevent the inspections from identifying and destroying all of its capabilities. Iraq removed chemical production equipment and documentation. It may also have removed chemical agent, precursor chemicals, and/or weapons. Inspections are *very unlikely* to discover any equipment or materials that Iraq has chosen to hide.

Iraq may have removed and hidden an entire sarin production facility. Iraqis admit that they had two such plants. One facility, bombed during the war, had been abandoned well before Desert Storm. The other was claimed to have been destroyed and was therefore uninspectable.

Although inspectors have license to probe Iraqi chemical capabilities in inspections anytime and anywhere, the current duties of CW inspections limit the resources available

to do so. Thus far, the process of verifying Iraqi declarations has been enormously time-consuming. Despite the strain on resources, many inspectors believe that a large part of the chemical program has been mapped out, including the fundamentals of the program. Presently, UNSCOM CW resources are being expended primarily in the destruction of leaking or corroded chemical containers and weapons. However, many inspectors carry the suspicion that while the UNSCOM process is busy cleaning up Iraq's old and useless stockpiles and capabilities, Iraq is concealing its "good" equipment and chemicals elsewhere. Due to, Iraq having learned much about how to successfully hide facilities, inspectors might not find them even if time and money allowed a more comprehensive look.

SECTION 3

BIOLOGICAL WEAPONS INSPECTIONS

This section is divided into four parts. The first describes the Iraqi biological weapons (BW) effort and some of the difficulties associated with identifying clandestine BW programs. The second outlines two UNSCOM BW missions (7 and 15) and the biological portion of a CBW mission (21).

The third part focuses on Iraqi camouflage, concealment, and deception (CCD) activities with regard to the BW program. CCD activities include observable efforts by Iraq to obstruct or slow the BW inspection process, as well as concealment efforts that were uncovered during inspections. Speculation on successful CCD techniques to hide an active BW production program and/or a stockpile is discussed in Section 8, Potential Break-out Scenarios.

The fourth part lists views of inspectors on lessons to be learned for verification inspections. They are divided into those specifically useful for BW inspections, and those that are generally useful to BW as well as nuclear, chemical, and missile verification.

3.1 THE IRAQI BW PROGRAM.

In 1931, Iraq ratified the Protocol for the Prohibition of the Use in War of Asphyxiating, Poisonous or Other Gases, and of Bacteriological Methods of Warfare--the Geneva Protocol, which prohibits use but not possession of BW agents. Iraq also signed the 1972 Convention on the Prohibition of the Development, Production and Stockpiling of Bacteriological (Biological) and Toxin Weapons and on Their Destruction (the Biological Weapons Convention or BWC), but did not ratify it until April 18, 1991.

Despite Iraq's signing the Geneva Protocol and BWC, there were suspicions discussed in unclassified Western literature that it was producing biological weapons as early as January 1988. U.S. intelligence had traced exports of equipment from unnamed European countries to Iraq that could be used for BW research.³ One inspector estimated that Iraq began an import program for BW agents and production equipment in 1985; this program remained unchecked until 1988, thus allowing a three-year window to obtain the

³"Iraq 'developing germ warfare capability'," *Jane's Defence Weekly*, January 9, 1988, p. 3.

basics of a BW production program. Also, there were reports that Iraq was producing botulinal toxins⁴ and was trying to develop tularemia bacteria (*Francisella tularensis* is an antipersonnel agent that the United States studied and weaponized prior to the termination of its biological weapons program in 1969).⁵ In September 1990, then-CIA Director, William Webster stated that the CIA estimated that Iraq had "a sizable stockpile of chemical and biological weapons."

Baghdad insisted in an April 19, 1991 report to the United Nations that it did not possess any biological weapons. Throughout the inspections, Iraq has continued to maintain that it had not produced and did not possess weaponized biological agents.

When UN inspectors arrived in Baghdad in August 1991, Iraq confirmed some information that was already in the public domain--that it had conducted BW-related research for military purposes--and provided a few additional details. It was not until the fourth day of the first UNSCOM BW inspection that Iraq admitted that its BW research was for offensive purposes. All inspectors interviewed agreed that it would not have been possible to discover the nature and extent of the Iraqi BW effort if Iraq had not chosen to disclose the information that it did.

Iraqi officials admitted to the UNSCOM 7 team that work on BW had been initiated at Salman Pak in mid-1986. Work was conducted on *Clostridium botulinum*, *Clostridium perfringens*, and *Bacillus anthracis*. A number of other bacterial seedstocks were also in Iraqi possession. Among the most important Iraqi admissions were:

- In 1987, Iraq began using a 150-liter fermenter to produce *Bacillus thuringiensis*. This insect-specific pathogen and its toxin are simulants for BW agents.
- Iraq produced *Bacillus anthracis* in 1-liter quantities using manual techniques and flasks.
- *Clostridium botulinum* and its toxin were produced in small 7- and 14-liter fermenters.

⁴"We Have Surprises," *Der Spiegel* in German, October 8, 1990, pp. 148-152, translated in FBIS-WEU-90-196, October 10, 1990, p. 9.

⁵David B. Ottaway, "U.S. Gave Iraq Bacteria, Senator Charges," *The Washington Post*, January 26, 1989, p. A16.

- An aerosol chamber was used (perhaps as early as 1983) to test the effects of pathogens and toxins on animals.
- Work nearby the Salman Pak BW site included development of a small electronic drone or "crude cruise missile." (At least one inspector suspected that this was intended to be a BW delivery vehicle.)

Several inspectors were convinced that Iraq had removed not only equipment associated with BW agent production, but also had hidden its stockpiles of agent or seed stocks needed to replenish stockpiles. All inspectors agreed that it was technically possible for Iraq to have done so without detection.

3.2 THE UNSCOM MISSIONS.

Iraq was able to gauge how much Western intelligence knew about its BW program before the UNSCOM missions by assessing two sources of information: Western press reports and coalition bomb targets. Press reports told Iraq a number of details, such as the fact that Salman Pak was thought to be the location of BW efforts, and that Iraq had imported some samples from the American Type Culture Collection. Iraq also knew that if a site had not been bombed, there was a good chance that inspectors would not know about it. Thus, when UNSCOM inspectors arrived in Iraq to inspect the Salman Pak facility, Iraqi officials not only had indications of what the inspectors knew, but also had ideas about what they did not know.

3.2.1 UNSCOM 7.

The first of two teams to investigate Iraq's biological weapons capabilities, UNSCOM 7, visited Iraq from August 2 to August 8, 1991. The mission of the team (comprising scientific, medical, and safety, information; and ordnance sub-teams) was to define the scope and nature of Iraq's microbiological activities. Iraq informed the 28-member team that it did engage in biological research, but denied making germ weapons.

The focus of UNSCOM 7 was on facilities at Salman Pak research center, 35 km southeast of Baghdad. This research park is isolated, but readily accessible by road. The facility had several bunkers and was protected by air defenses. A section of the site was occupied by a military unit. At the site, there was an electronics research facility, a manufacturing facility, and warehouses. The visit to Salman Pak was announced only on the eve of the inspection.

Iraqi officials said that 85 people were employed in the forensic facility, a laboratory to identify chemical and biological contamination in food. Of these, only ten were said to have conducted BW research. Iraqi officials stated that Salman Pak was part of the Center for Technical Research, an umbrella organization that covered activities at another suspected BW site, Al Hakam. Dr. Taha, who ran the BW program, reported through the director of the Center to the Minister for Military Industrialization, who at the time of the inspection was the current Minister of Defense, Hussein Kamil Hassan. Dr. Ahmed Murthada (who is also a Brigadier General in the Iraqi armed forces) holds a Ph.D. in mechanical engineering from a British University and was Director General at Salman Pak. Murthada is an important individual, having been a leader in Iraq's ballistic missile program, in charge of a facility producing conventional munitions, and involved with the nuclear program. The work was done under the auspices of the Ministry of Industry and Military Industrialization (renamed the Corporation for Industry and Military Industrialization).

Salman Pak was extensively damaged by coalition bombing, but Iraq also contributed to the destruction of the site by demolishing key buildings and burning records. Although Iraq attempted to obfuscate the nature and extent of its BW program, evidence was revealed which led inspectors to conclude that Iraq was developing highly, lethal strains of several biological agents.

After extensive questioning, Dr. Murthada characterized Iraq's BW research as offensive in character. Evidence supporting the conclusion that Iraq was not focusing on defense included the fact that there was no indication that Iraq was developing vaccines or protective clothing.

Iraqi officials maintained that all biological research conducted at Salman Pak was stopped in August 1990 and all agents destroyed. No evidence was provided to support this claim. The reason given for the termination of operations and the abandonment of Salman Pak was that the Iraqi leadership feared that the facility would be bombed, causing the release of the deadly agents. Iraq's justification for previously providing the UN false information on its biological program was that it feared the research would have been misconstrued by the other countries⁶ and blown out of proportion by the Western media.

⁶U.N. press release, "Aim of Biological Research Defensive, Iraq Tells UN Inspection Team," no. IK/43, August 5, 1991; U.N. press release, "Press Briefing By Officials of UN Inspection Team on First Visit To

Officials at Salman Pak stated that they undertook research on *Clostridium botulinum* strains (which produce botulin toxins type A, E, and F), *Clostridium perfringens* (which produces toxins, including epsilon toxin), and *Bacillus anthracis*. Despite the fact that Iraq claimed that all existing stockpiles of biological agents were destroyed, they supplied the team with sample strains of *Brucellus abortus*, *Brucella melitensis*, *Clostridium Tetani* (tetanus toxin), *Francisella tularensis* and various strains of *Clostridium botulinum*, all of which can be used as BW. They also gave the team simulants of biological warfare agents, namely *Bacillus subtilis*, *Bacillus cereus*, and *Bacillus megaterium*.⁷

UNSCOM 7 discovered, at Salman Pak, a capability to research, test, produce, and store biological agents usable as BW. Evidence indicated that there had been fermentation, production, aerosol testing, and storage equipment on-site. The facility had a 150-liter fermenter, purchased in 1985, that could be filled to capacity twice a week. There also were 7-liter fermenters that were capable of being used to produce botulinum toxin. The team found a hardened, stand-alone microbiological cold store suitable for storage of anthrax spores and toxins. At least one inspector felt that because Salman Pak also was an electronics manufacturing facility, a weapons system for delivering agents also could have been made there.

A German-made, stainless-steel aerosol chamber had been located at Salman Pak and, by Iraqi admission, was used for testing anthrax dispersal. At the time of UNSCOM 7, however, it had been removed. After repeated questioning, the Iraqis took the inspectors to see it. It had been crushed and was at a garbage dump.

Although the team did not find completed biological weapon systems, agents, or equipment to fill weapons with biological agents,⁸ the site could have been used for such

Iraq's Biological Weapons Facilities," August 14, 1991; Smith, "Iraq Admits To Germ Warfare Research," p. A11.

⁷Report by the Executive Chairman of the Special Commission established by the Secretary-General pursuant to paragraph 9 (b) (i) of Security Council Resolution 687 (1991), No. S/23165, p. 30.

⁸U.N. press release, "UN Inspection Team Reports On Iraq's Biological Weapons Capacity, Finds No Evidence of Current Stocks," no. IK/46, August 14, 1991; Dan Charles, "Iraq admits growing deadly biological arsenal," *New Scientist*, August 24, 1991, p. 12; "Iraqi CBW Armament and the UN Special Commission," *Chemical Weapons Convention Bulletin*, September 1991, p. 21.

purposes. Iraq may have been able to produce as much as 50 gallons of anthrax each week at Salman Pak.

3.2.2 UNSCOM 15.

The second biological weapons inspection team, UNSCOM 15, visited ten sites in Iraq from September 20 to October 3, 1991. The purpose of the team was to verify the scope of Iraq's biological activities. The ten sites visited were: Samarra, Al Hakam, Doura, Fudaliyah, Abu Ghuraib (Al Kindi Company), Al-Ameriya, Medical City in Baghdad, Slaughter House in Baghdad, An Najaf, and Taji. The schedule did not include Salman Pak. The sites chosen were vaccine production facilities, a pharmaceutical plant, a blood bank, research and development laboratories with fermentation capabilities, and facilities specifically designed to conduct research on pathogenic agents. Three of these sites were not declared by Iraq. All of these undeclared sites, and one declared site, were visited unannounced. There was agreement among inspectors interviewed that Iraqis were unaware of which facilities would receive surprise visits. No evidence was found that would prove that BW weapons were produced in any of those facilities.

The Samarra Pharmaceutical Facility (100+ km north of Baghdad) was set up with Soviet and German assistance. The team inspected a pharmaceutical plant at Samarra, part of the Iraqi State Enterprise for Drug Industries. It learned that the Iraqis had set up five 1,000-liter fermenters for antibiotics at Samarra but had them removed about ten years ago. The Iraqis stated that the Soviet Union supplied the fermenters, which were substandard and not useful to their program. While undergoing inspection, the Iraqis were producing pills on-site and had bulk quantities of drugs in storage. The team noted that the Iraqis did not use the most modern technologies and were sloppy with their manufacturing techniques. Also, by comparison with standards used in the United States, Europe, and Japan, the Iraqis used poor occupational health and safety standards. UNSCOM 15 concluded that the facility was a legitimate formulation factory.

Doura, Baghdad was another site inspected by UNSCOM 15. The Iraqis maintained that they operated a foot-and-mouth disease vaccine plant at Doura, which was designed and built by the French (Rhône Mérieux). The facility had exported veterinary vaccines to France and employed some French technicians, who later left Iraq. Their departure led to the decline in the quality of plant operations. The fermenters, lyophilizers (freeze-driers), and cell homogenizers at Doura could have been used to produce large quantities of biological warfare agents. UNSCOM 15 determined that the facility was being used

for its declared purpose at the time of inspection, but recommended that it be monitored because of its BW capabilities.

At Abu Ghuraib, west of Baghdad, the Al Kindi Company for Serum and Vaccine Production produced legitimate animal toxoid vaccines such as for anthrax, clostridium, fowl pox virus, and rinderpest virus. This main facility occupied an entire block. The complex also contained buildings set apart from the main building. There were suspicions that the Al Kindi Company produced biotoxins, but the team did not find evidence of this at this heavily bombed complex. The Iraqis said that the fermenters that once were at this site were sent to Al Hakam. During the inspection, the team observed Iraqi technicians in a "warm room" manually making vaccines in 5-liter flasks. They said they could make 1,000 liters per week of clostridium vaccine. The Iraqis related to the UNSCOM 15 inspectors that they also worked on vaccines for anthrax, *Clostridium welchii*, *Clostridium chauvoei*, *Clostridium novyi*, and *Clostridium perfringens*.

Iraq declared that it made vaccines for typhoid and cholera--diseases indigenous to Iraq--manually at the Serum and Vaccine Institute at Al-Ameriya, located west of Baghdad. These Iraqi-made vaccines, as well as some imported vaccines, were distributed by the Al-Ameriya facility.

Al-Ameriya was also the site for research on diphtheria and brucella vaccines. This facility exhibited poor health and safety standards. For example, a pregnant woman was working in this plant where there was ongoing research on brucella, which is known to cause miscarriages. The UNSCOM mission determined that Al-Ameriya had a capacity to produce pathogens.

The Iraqis claimed that a complex at Fudaliyah, east of Baghdad, was an agricultural and water resources research institute run by the Scientific Research Council. Supposedly, it was shut down in December 1989 because it was unproductive. The team discovered abandoned equipment, including a 300-liter Chemap (Swiss-made fermenter) and a 75-liter fermenter, both designed for production of foodstuffs. Either fermenter could have been used to produce pathogens. The facility was low-containment and had no biohazard cabinets, although it could have been used for BW research and production if "Western-style" safety requirements were ignored.

UNSCOM 15 looked most closely at the Al Hakam complex, which is part of the Technical Research Center. It was learned during UNSCOM 35 that Dr. Taha heads Al Hakam. She worked closely with Dr. Al Hindawi; both were believed to have worked on

the production of botulinum toxin at Salman Pak. (Dr. Al Hindawi had set up a single-cell production facility at Taji, which since has been abandoned.) An Iraqi military construction firm, Technical Corps, which built missile-related facilities, constructed the Al Hakam complex quickly during 1988-89. The Iraqis voluntarily declared this facility, located 70-80 km east of Baghdad. The plant was laid out like a military facility; it was relatively isolated and surrounded by a 4 x 6 km barbed-wire fence, air defenses, and ten guard posts. The front gate also had a pop-up tire shredder. All of these features cause one to doubt that Al Hakam was developed simply for civilian purposes.

The Iraqis told the inspectors that the Al Hakam facility, which had not been completed before the war, was supposed to produce single-cell protein, which is used to supplement animal feed. It is possible, though, that Al Hakam had been intended to be part of a BW production effort because it possessed equipment that would be usable in a BW program.

The facility had two 1,800-liter fermenters (made by Olsa in Milan) moved from Al Kindi; several 1,200-liter mixing tanks; a 450-liter fermenter from Taji; a 150-liter Chemap (Swiss firm) fermenter from Salman Pak; and, a 400-liter fermenter. The 450-liter fermenter had a continuous separating centrifuge and a cell drier. None of the fermenters were functioning. There also was a large building that was intended to hold a 5,000-liter Chemap fermenter that Iraq had tried to import. Several western countries successfully pressured the Swiss into not selling this equipment to Baghdad. Consequently, the plant was left unfinished. All samples taken by the UN team from the fermenters were negative. This was expected, however, because most BW agents would not be detectable after even a short period of time.

If Al Hakam were intended for BW production, it would have been dangerous to employees working there. There was no equipment for air handling or containment, although this could have been added subsequently.

The site at Taji, which had facilities to produce single cell protein, was declared abandoned and not useful to a BW program. Fermenters there were taken to Al Hakam. The blood bank at Medical City, Baghdad, the Baghdad Slaughter House, and the site at An Najaf also were cleared of suspicion.

3.2.3 UNSCOM 21.

Between November 17 and 30, 1991, UNSCOM 21, a joint chemical/biological weapons inspection team, was dispatched to Iraq to examine 13 sites. The purpose was to examine airfield bunkers and ammunition depots where undeclared chemical and biological agents might be stored. Salman Pak and several undeclared sites were visited on very short notice. The team did not uncover evidence that Iraq had produced or was developing biological weapons. Absence of such evidence, however, does not lead to the conclusion that the sites had not been used for such purposes in the past. There was one discovery relevant to ballistic missiles that is discussed in Section 5 of this report.

One interesting discovery that could have been related to BW was aircraft equipped with 40-liter tanks. The tanks had nozzles that conceivably could have enabled spreading chemical or biological agent. The Iraqi explanation for the equipment was that it was for seeding rain clouds. However, this is unlikely to be true, as the region is desert and without agriculture.

3.3 IRAQI BEHAVIOR IN THE BW INSPECTIONS.

Iraqi officials were superficially cooperative during UNSCOM 7 and 15, and both teams also encountered instances when the Iraqis reacted obstinately to their requests. By comparison with the first two BW missions, Iraq was significantly more uncooperative during UNSCOM 21. (One inspector interviewed disagreed with the characterization of Iraq's attitude as being uncooperative, saying that the delays in answering questions were understandable.)

There are several possible explanations for the differences in Iraqi response to the first two inspections versus the third. A central reason may be the probability that the Iraqis expected inspections of the sites covered by UNSCOM 7 and 15 but did not anticipate the sites addressed by UNSCOM 21 to be covered. Other factors may be the nature of the Iraqi personalities involved and the fact that Iraq may have genuinely believed that the sites were irrelevant to UN Resolution 687 and therefore not appropriate for inspection.

3.3.1 Obstruction and Noncooperation.

At the inspected facilities, access was not restricted. However, the teams' time for inspection was curtailed by obfuscation and delay. Iraqi officials refused to provide

inspectors with requested funding and planning documents. Many Iraqi answers were not appropriate to the questions asked.

One Iraqi tactic to avoid giving information was to feign incomprehension and request that an interpreter be used, despite the fact that up until that moment when they were given a question that made them uncomfortable, they spoke English fluently. The Iraqis also feigned incompetence in order to lower the expectations of Westerners as to what they were capable of managing. The frustrating Iraqi behavior, in some cases, had the desired effect. Contradictory statements from the Iraqi guides led some inspectors to conclude that the Iraqis were too disorganized to keep accurate records. In fact, it is known that the Iraqis were meticulous recordkeepers, even with regard to the mass murder of Kurds in Iraq.⁹

During UNSCOM 21, Iraqi officials strenuously objected to aerial reconnaissance and attempted to prohibit photography. The situation became so tense that the team leader was forced to halt the inspection process to clarify the team's rights and to obtain Iraqi promises of cooperation.

The inability of inspectors to interview all personnel that worked at the sites was also a form of obstruction. As with other UNSCOM inspections, inspectors were only exposed to the same limited set of people, regardless of the site visited. In the case of the biological facilities, the Iraqi guides refused to admit that more than a handful of people worked on BW projects at the inspected facilities. They also had well-rehearsed, stock answers to many of the questions posed by the inspectors.

The fact that the BW UNSCOM missions met only a few Iraqis, and that those Iraqis claimed that there were but 10 people in the BW program led at least two inspectors to conclude that the program was small and limited in scope. Another inspector pointed out, however, that there is no way to determine the scale or scope of the BW program. The fact that some inspectors did reach such a conclusion attests to the fact that, if the effort is indeed large-scale, the Iraqi tactics (of limiting exposure to personnel and claiming the program was small) worked.

Several inspectors noted that in addition to not identifying the number of people, there were apparent gaps in the chain of command. The gaps seemed to be most common

⁹Jonathan C. Randal, "Iraqi Files Point to Mass Deaths," *The Washington Post*, February 22, 1992, p. A1.

between the political directors and the technical staff. It is possible that Iraq is concealing the identity of its top scientists.

Time delays and transportation difficulties--whether intentional or not--effectively limited inspections, particularly UNSCOM 21, the first joint BW/CW inspection. The distances between sites required transportation by helicopter. Iraq claimed it required 15 hours notice to stand down air defenses to allow the helicopters to fly to sites to be challenge inspected. The inspectors tried to avoid revealing the exact site of the facility to be inspected by selecting a wide swath of territory to be flown over. Nevertheless, the Iraqis could have received some benefit from the advance warning if they were particularly concerned about a given site within the swath.

Other limitations were introduced by delays in aircraft taking off, flying slowly, and flying without night vision capability. The latter factor forced the inspection teams to halt inspections by about 1500 hours to allow return to Baghdad during daylight. When transportation was by ground vehicle, trucks often were unable to exceed 50 km per hour.

3.3.2 Intimidation.

Iraq did attempt to sidetrack the UN inspection teams by employing "bully tactics". During UNSCOM 7, the Iraqis deliberately placed ordnance and a radioactive source at some bunker sites at Salman Pak, probably in order to convince the team that it was at risk in some sections of the facility. These findings surprised the team and delayed the inspection while the ordnance was removed, and an expert was called in from the nuclear team to check the radioactive source.

There were also instances where the "minders," those Iraqis in charge of monitoring the inspectors and their conversations with Iraqi site-personnel, curtailed the explanations of the Iraqi workers. Also the minders pressured Iraqis who could speak English not to do so and to depend on translators. Videotaping of all inspection activities and conversations also took place, and may have intimidated some of the Iraqi personnel.

During UNSCOM 21, Iraqi officials were aggressively offensive, particularly to selected team members. When safety inspectors were separated from the team leader during their reconnaissance of a site, the intimidation tactics were even more aggravating.

3.3.3 Destruction, Removal and Dispersal of Evidence.

Buildings were razed, sites regraded, and soil removed in an apparent effort to remove any incriminating evidence. The Iraqis destroyed facilities suspected of being used for BW research and "cleaned" other facilities of "old" or "useless" equipment. Iraqis knocked down several key buildings at Salman Pak and placed new soil over the sites. They claimed that these buildings had been damaged heavily by Desert Storm bombing and had to be demolished (even though other heavily damaged buildings remained standing at the same sites or other locations).

During UNSCOM 7 Iraq admitted having a 6 cubic meter aerosol chamber bought from the German firm of Karl Kolb. Repeated attempts were made to locate the chamber. Iraqis insisted the chamber was supposed to go into a building that, ultimately, the UN inspectors judged unlikely to accommodate it because the building had little running water, no sewers, and very little electrical power. That building had been leveled. The Iraqis said the building was destroyed during the bombing, despite the fact that there were no craters to indicate that the area had been targeted. At the end of the inspection, Iraqi officials showed the chamber to the inspectors. It was lying, crushed, at a garbage dump near Baghdad, apparently rolled over several times by a bulldozer.

At the Samarra pharmaceutical plant, no evidence of biological weapons research was evident. The only suspicious factor was the absence of five Soviet-supplied 10,000-liter fermenters which the Iraqis claimed had been removed and destroyed years ago—a claim that is impossible to verify. The fermenters could conceivably have been removed for use elsewhere in the country to develop biological warfare agents.

3.3.4 Misrepresentation.

One inspector cited a case of misrepresentation may have stemmed from lack of understanding of international labeling criteria for biocontainment facilities. UNSCOM 7 and 15 investigated buildings that the Iraqis claimed were P4 (or biosafety level or BL4) facilities.¹⁰ When the inspectors examined the building, they determined that they were either P2 or P3 facilities, and not, as Iraq claimed, P4.

¹⁰A P4 facility uses maximum containment equipment to protect against the spread of highly pathogenic organisms. P2 and P3 facilities are designed to protect against moderately and moderate to highly pathogenic organisms.

Two inspectors offered possible explanations for the discrepancy. One said Iraq might have based its assessment of its facility on the fact that Foot & Mouth Disease is researched there. World Health Organization guidelines state that this disease should be handled only in P4 facilities. Iraq might have concluded, therefore, that their conduct of Foot & Mouth Disease research at the site meant that it was a P4 facility.

Another explanation given was that the Iraqi declaration could have been intended to deceive the inspection team. That is, the Iraqi's may have reported to UN officials that they had a P4 facility, but later decided that they did not want to reveal the activities at that facility. So the Iraqis may have shown the inspectors P2 or P3 facilities and merely relabeled them P4 facilities, thus refraining from revealing the real P4 site.

Misrepresentation is evident in the case of the Al Hakam facility. Iraq claimed that the facility was for peaceful purposes only. Yet, Al Hakam was laid out like a military complex, replete with buildings constructed by the military construction firm Technical Corps, dummy bunkers, barbed-wire fencing, guard posts, and tire shredders.

Inspectors did not have a common view on whether Al Hakam was designed for BW research and production. One said that the site was "the mother of all BW facilities," while another claimed that it was not well-equipped for such activity at all. Evidence on the side of the former argument included: the single-cell protein development program for which the site ostensibly was built was not well developed; no documents related to the facility were provided to the team; the plant was rapidly constructed in less than two years, receiving much higher priority than placed on other microbiological activities in Iraq; the facility was laid out like a military installation; people previously involved with the Iraqi BW program were present at Al Hakam; fermenters useful for BW had been brought to Al Hakam from other sites in Iraq; and Iraqi guides and plant personnel were not candid with the inspection team. Also, despite claims that Iraq was using Al Hakam to produce single-cell protein for the country, there were no stockpiles of single-cell protein or evidence that they were doing such research. A point raised by one UN inspector was that the 5,000-liter Chemap fermenter purchased by Iraq for Al Hakam, which was never received, would have been very inadequate for the country's protein needs. To have a successful protein production program would have required additional fermenters. The Chemap fermenter, however, would have been highly useful for a BW program.

Countering the argument that Al Hakam was intended for BW research and production is the fact that the facility is designed to be used without microbiological

containment. If Iraq were to use Al Hakam for BW, it would either have to modify the new facility or risk serious accident. Nevertheless, it is quite credible that Iraq would undertake BW activities without much attention to safety measures. Certainly, Iraq's behavior in chemical agent and weapons production indicates a general lack of concern for health and safety measures. Assuming that Iraq would use the same containment equipment and procedures as are used in the West is misleading mirror-imaging. When the United States and United Kingdom stopped their offensive BW programs, neither was using containment facilities equivalent to today's P3 and P4 criteria. As one inspector noted, "The containment argument is spurious."

3.4 LESSONS LEARNED FOR VERIFICATION.

Interviewed inspectors were united in their assessment that a well-hidden BW program cannot be discovered. Learning about a country's BW program depends on gaining intelligence from human sources. In the case of on-site inspections in Iraq, all that was learned about the Iraqi BW program was gained by discussion pointing out inconsistencies, and relating physical attributes of resources to the declared function. Thus, the Iraq BW inspections were useful, but should not be expected to be a precedent for what can be learned by any other BW verification inspection. Inspectors were united in the view that verification exercises in which the inspectee intentionally reveals nothing will very likely be futile. Lessons learned are divided into two categories: lessons stemming from the nature of biological weapons and production techniques, and lessons related to inspections.

3.4.1 Lessons Related to Biological Weapons Programs.

3.4.1.1 A BW capability does not require large inventories of sophisticated equipment or sprawling laboratories; it can be hidden in only a few rooms. There are no unique features of a BW program which would signal its existence. If there were a risk of discovery, agents and evidence could rapidly be eliminated. The Iraqi BW program at Salman Pak employed only 10 people (according to Iraqi claims), utilized 7 or 8 rooms, and had no sophisticated equipment.

3.4.1.2 Biological agents are hidden easily. The agents themselves may be stored in small containers and can be readily transported. If Iraq has hidden agents--or even weapons, which would necessarily be larger--there will be virtually no chance of finding them unless a defector were to reveal the site and it could be accessed before the agents or weapons could be removed. While weapons or agent may require environmental

control (to maintain temperature or reduce exposure to light), finding bunkers or storage facilities equipped with such controls is likely to be exceedingly difficult if the builder has intentionally concealed them.

3.4.1.3 An effective program does not require that large amounts of BW agents be produced. A relatively small amount of a pathogenetic agent is required to kill or incapacitate a significant number of an enemy's population or armed forces. Once the agents are manufactured, the facility can be disassembled or redirected to other functions.

Some agents do have limited shelf-life, which would restrict the length of time they could be retained before they either had to be used or replaced. Botulinum, for example, is relatively labile, whereas some toxins are fairly stable.

3.4.1.4 There are inherent difficulties in distinguishing between peaceful and military biological research. All BW equipment is dual-use and can be used for legitimate purposes. Iraq could credibly claim that its technologies are necessary for medical research. The same equipment that is used to make vaccines, for example, can be used to make lethal agents.

If a BW program is discovered, the country in question could claim that it is for defensive purposes only. Suspicions would be raised, however, if true defensive measures--such as detectors and medical countermeasures--were not a focal point of the research. Evidence of weapons evaluation and field testing, if it can be obtained, also would indicate an offensive BW program.

3.4.1.5 Restrictions on exports are unlikely to inhibit a country dedicated to developing BW. Fermenters with large capacities are not required; biological agents can be produced in ordinary flasks. For large-scale, efficient production, fermenters would be needed. If a country were to have difficulty in importing them (though unlikely because of their widespread availability and use in medical- and food-related work), it might choose to build its own. For a less developed country without substantial technical infrastructure, this would constitute a difficult, but not unachievable challenge.

The raw materials for BW agents--the living organisms--are available in nature. Prohibiting exports of samples could delay a program, but might not halt it.

3.4.1.6 Inspection of physical sites can determine whether it has the capability to produce BW agents, but is unlikely to reveal whether it has been or will be used for such purposes. Revelations about Iraq's BW program were from discussions held with Iraqis,

not from on-site inspections. Inspections of sites such as the Samarra Pharmaceutical plant can reveal whether there is equipment usable for BW present. This is useful in determining whether a facility should be monitored for potential BW production, but it does not provide assurance the plant has not been or will not be used for BW.

3.4.1.7 Portable real-time BW detection equipment does not exist. Inspectors noted that equipment for BW detection and analysis on-site and on-line was insufficient. The basis of the insufficiency rests not on the lack of availability of such equipment to the UN teams, but rather because it is not portable.

Inspectors did use the ELISA (enzyme-linked immunosorbant assay) test to analyze samples for presence of botulinum, anthrax, or plague. Because the equipment for ELISA is bulky, samples had to be taken to Baghdad. Other samples taken during the BW inspections had to be analyzed at laboratories in the United Kingdom, thus precluding teams from following-up on any findings.

It must be noted that any portable detection equipment that might become available in the foreseeable future would still require more precise analysis at a sophisticated laboratory. However, preliminary findings by on-site analytical equipment would allow teams to collect samples more effectively and take greater safety precautions.

3.4.2 Lessons Related to BW Inspections.

3.4.2.1 The inspection team should include experts who are familiar with the latest technologies and with military applications of biological agents. Many of the advances in biotechnology techniques and equipment have taken place in the last ten years. Genetic engineering, reverse transcription, and other discoveries enable scientists to "design" more deadly weapons and to produce them quickly and efficiently. Individuals who have recently received graduate training, or are working in high-technology projects, are likely to have training and experience with these advances.

There is some danger, however, in focusing too intently on modern processes and means. For example, a country may not use advanced techniques and may manufacture agent manually. An inspector from private industry--used to working only with the most sophisticated equipment and processes--may risk mirror-imaging and assuming that no country would go the "low-technology" route.

In addition to experts familiar with production of agents, it is crucial to have individuals who understand military BW applications. The equipment and procedures

used for weaponization may not be readily identifiable by experts familiar only with the agent-production aspects of the BW process.

3.4.2.2 All inspectors should have been inoculated against known BW agents for which vaccines have been developed. Some individuals participated on the BW UNSCOM missions without proper inoculations. Because some of the vaccines take multiple exposures over months to assure immunity, there was no time to properly administer them.

Some inspectors felt that a cadre of BW inspectors inoculated against the most common agents should be available for any future inspections where BW agents may be present. Other inspectors said that this would be impractical, as one would not know which agents are likely to be found and that there may be medical difficulties associated with many inoculations--up to 15 possibly--in any one person.

3.4.2.3 Four experts in BW will ordinarily be enough for any given inspection. Any standard microbiology laboratory can be used for BW production in limited quantities. For large-scale production, fermenters are likely to be required. For testing, aerosol chambers may be on site. BW inspectors can check to see whether such equipment is present. Also, if cultures are present, they can check to see whether they are BW agents. These activities do not require a large number of experts.

Nevertheless, there may be missions for which larger numbers are needed. For example, a team may be required to split up if an inspection must be made of a large site within time constraints.

3.4.2.4 Consideration should be given to how samples of suspected plant-specific BW agents will be analyzed. The laboratories most commonly mentioned as being capable of analysis of biological agents deal almost exclusively with agents which affect animals. Any BW analytical laboratory must have a "library" of possible pathogens, as well as technicians experienced in working with the type of agent under consideration. In the future, there may be instances in which samples suspected of being plant-specific agents must be analyzed. It is important to identify a laboratory with an internationally recognized capability to conduct such analyses.

3.4.2.5 Information on the intent of inspectors may be imparted to the inspected country if inspectors are not better trained in operational security. UNSCOM 21, for example, attempted to maintain secrecy about the sites to be visited until the inspectors were airborne and nearing the suspect site. Some inspectors felt that the Iraqis knew some of

the sites to be visited in advance, perhaps by overhearing careless conversations among inspectors. Also, the route of the helicopters, which flew slowly, could have given some advance notice of likely sites to be visited.

3.4.2.6 Intelligence briefings can prejudice the outcome of an inspection. For example, a building identified as unimportant during a briefing could be ignored, even when it is actually important. Thus, while intelligence data should be used to pare down the number of buildings that need close examination, it should not be the sole criterion for deciding what places are to be searched. Team members should be given latitude to expand or redirect inspection targets, even if intelligence information indicates otherwise.

3.4.2.7 Some inspectors may feel compelled to represent the views of their home government's position, regardless of evidence. Some inspectors may have views shaped by their government's political outlook or intelligence analysis. Thus, they are predisposed toward a given conclusion and do not have the flexibility to see alternative explanations or conclusions. This can cause the inspector to urge that a country or site be given "a clean bill of health" when it should not be, or can result in the opposite--a dogged determination to find guilt when there is none.

3.4.2.8 Emergencies are extremely distracting and time-consuming. A medical emergency during UNSCOM 21 proved the point. Significant time was drawn away from the inspection process and concerns continued to preoccupy team members. This serves to underscore the likely effects that any staged accident or emergency could have on an inspection team. The time required to deal with the event could enable the inspected country to spirit away equipment, papers, or other evidence.

3.4.2.9 Some team members observed that it is important for inspectors and inspectees not to be professional colleagues or personal friends. A businesslike distance must be maintained in interpersonal interactions. In the case of Iraq BW inspections, some inspectors felt that the relationship between selected team members and Iraqi counterparts was friendly to the point of damaging the professional demeanor of the inspections.

3.4.2.10 Knowing exact location can be crucial to inspectors, so the global positioning system (GPS) is essential to all types of inspection teams. Line drawings of sites based on intelligence were extremely helpful in locating sites for inspections. Changes due to bombing, purposeful destruction, and razing of sites can be confusing. Also, there were times when Iraqi guides did not know where they were. Their confusion could have been dissembling, but in many cases appeared to some inspectors to be genuine.

3.5 CONCLUSION.

During the first BW inspection, Iraq confessed to having an offensive BW research program. Most inspectors agree that if Iraq had chosen to stonewall inspectors, physical inspection of facilities would not have enabled inspector to gauge either the extent or the nature of the Iraqi BW program. The physical inspections were useful in identifying the locations and equipment that could be used for BW research and production, and therefore should be monitored. They were also useful in determining that a particular facility, Al Hakam, may have been designed for the BW program. Inspections were unable, however, to uncover documentation, equipment, or other details that the Iraqis were unwilling to disclose. Thus, Iraq may have produced biological weapons, and may even have an existing production capability as yet undiscovered.

Iraqi behavior in the BW inspections was consistent with that in the other types of inspections. It limited information by a variety of means (videotaping, removal of documents, etc.) and was often uncooperative.

SECTION 4

NUCLEAR WEAPONS INSPECTIONS

This section outlines the Iraqi nuclear program, describes the inspections conducted by UNSCOM in conjunction with the International Atomic Energy Agency (IAEA), and defines some of the lessons relevant to verification activities.

4.1 THE IRAQI NUCLEAR PROGRAM.

In 1969, Iraq ratified the Nuclear Non-Proliferation Treaty, and in 1972 it signed a safeguards agreement with the International Atomic Energy Agency (IAEA). This agreement provided for periodic IAEA inspections of all declared nuclear facilities and materials. Despite these commitments, Iraq pursued technologies necessary for nuclear weapons development.

In an attempt to derail Iraq's nuclear weapons program, Israel attacked Iraq's French-supplied Osiraq reactor in June 1981. This was a serious setback for the Iraqi nuclear program, but did not end it. Iraq renewed its efforts, but with greater attention to concealment.

Iraq declared the Soviet-built IRT-5000 reactor, Tammuz-2, and the Italian-built fuel fabrication laboratory. Baghdad secretly built other facilities in support of a large-scale and costly nuclear weapons development program. Initially, it pursued four different methods of uranium enrichment: electromagnetic isotope separation (EMIS), gas centrifuge, chemical enrichment, and gaseous diffusion. Gaseous diffusion reportedly was dropped in the late 1980s as being too complicated and risky. The others were pursued actively.

Substantial progress was made on EMIS technology. This technology had been developed by the United States shortly after World War II and was considered simple, but highly inefficient. EMIS-related equipment was not included in nuclear export control regimes not only because analysts thought the technology was unlikely to be used, but also because the components involved are fairly simple, and few, if any items are designed specifically for uranium enrichment only. EMIS showed more rapid progress than the other enrichment efforts.

Iraq chose EMIS, in part, because of its ease, accessibility of information and related equipment, and the low possibility of discovery. Rather than purchasing complete

facilities from foreign suppliers, the Iraqis established an indigenous capability for production of EMIS components.

Iraq also pursued gas centrifuge enrichment, which is a much more advanced and widely used process. By contrast, centrifuge enrichment technology is more tightly controlled. However, it is used commercially in Europe and has been successfully stolen and copied by Pakistan. It is not known how much, if any, information on centrifuges was obtained by Iraq from Pakistan, but it was apparent that information and technical assistance had been obtained from European companies, or their former employees.

Iraq also pursued reprocessing to obtain plutonium for weapons. As part of a research and development effort to enable large-scale plutonium production, about three grams of plutonium were separated from uranium fuel irradiated at the Tuwaitha facility. Although that facility was under safeguards and inspected twice a year, Iraq used non-continuous irradiation of fuel elements to escape detection. Iraq also is suspected of having built a clandestine underground reactor for plutonium production. However, successive UN/IAEA inspection teams have been unable to locate such a reactor.

Iraq produced small quantities of lithium-6, which can be irradiated in a reactor to produce tritium for nuclear weapon initiation devices, boosted weapons, or can be used directly in staged thermonuclear weapons. Although Iraq denies any program to develop boosted weapons, this is the most plausible explanation for Iraq's activities.

Iraq's nuclear weapon design, as outlined in secret Iraqi reports confiscated by the IAEA, would have been an intermediate-level implosion device.¹¹ Progress had been made in developing uranium metallurgy, high explosive lenses, detonators, and firing systems. The major obstacles remaining in Iraq's path were enrichment of sufficient weapons-grade uranium and integrated assembly of components. Estimates vary as to how far the Iraqis were from putting together a workable nuclear device at the time of Desert Shield/Storm. Most experts have projected that, based on UN/IAEA findings, Iraq was 12 to 24 months away from detonating a nuclear bomb. The official UNSCOM report states:

Given the information obtained about the advanced nature of Iraqi efforts to develop an implosion system, it appears that it is the availability of adequate amounts of fissile material that would have been the major factor

¹¹UN Doc. S/23215 (November 14, 1991) p. 18.

in determining how soon Iraq could have produced a nuclear device. For example, if Iraq would have started with natural uranium using its electromagnetic isotope separation (EMIS) technology, that time would have been as little as 12 to 18 months.¹²

4.2 UNSCOM/IAEA INSPECTIONS.

Inspections of declared and undeclared Iraqi nuclear facilities have been undertaken by the International Atomic Energy Agency (IAEA) under terms of UN Security Council Resolution 687, paragraphs 12 and 13. To comply with Resolution 687, Iraq was instructed to submit a declaration of the locations, types, and amounts of nuclear-weapons-usable material, related subsystems, components, or facilities. The IAEA, in cooperation with UNSCOM, was to carry out immediate on-site inspections of declared and designated sites; to develop a program for the destruction, removal, or rendering harmless of all nuclear weapons-related items; and to formulate a plan for future monitoring and verification of Iraqi compliance with its NPT obligations.

4.2.1 UNSCOM 1/IAEA 1.

For this first inspection, the major objectives were to inspect and seal Iraq's highly enriched fuel, and to test the accuracy and completeness of the initial Iraqi nuclear declaration of April 18, 1991. This Iraqi document rejected the UN contention of the existence of a nuclear weapons program and only declared the Tuwaitha site and materials already under IAEA safeguards. The inspectors examined the declared IRT-5000 reactor and 22 kilograms of highly enriched uranium (HEU). They confirmed the presence of recovered plutonium (2.26 g) and measured inventories of non-nuclear weapons-usable material.

The team also undertook the first short-notice inspection of a designated site, Tarmiya. This site "was noted as being unusual because of the mix of buildings with unusually large installed electrical power co-allocated with buildings with large chemical processing capabilities."¹³ The power lines had been run underground well away from the building to avoid drawing attention to the facility in intelligence photographs. The

¹²UN Doc. S/23165 (October 25, 1991) p. 5.

¹³UN Doc. S/22788 (July 15, 1991) p. 11.

evidence constituted the first clue pointing to Iraqi development of electromagnetic isotope separation (EMIS) uranium enrichment systems.

4.2.2 UNSCOM 4/IAEA 2.

The second IAEA inspection uncovered the basis of the Iraqi EMIS program. The inspectors found evidence of EMIS activities at Tuwaitha and undertook short-notice visits to six undeclared sites. At two of these sites, the Iraqis denied right of access and, contravening inspectors' orders, removed materials and equipment related to uranium enrichment. Tarmiya was identified as "a multi-billion dollar EMIS facility," but was thought by inspectors to have never been operational,¹⁴ an assessment later disproven. The inspectors also found "documented evidence of the ability to manufacture all required components for an EMIS separator."¹⁵

UNSCOMs 1 and 4 were remarkable not only for their discovery of heretofore unknown nuclear-weapons-related programs, but also for the Iraqi efforts to prevent discovery of the facilities and to deny information to the inspections. These efforts are described in detail later in this chapter.

4.2.3 UNSCOM 5/IAEA 3.

The third nuclear inspection mission was devoted to verification of a revised Iraqi declaration, presented on the second day of the operation (July 7). This declaration conceded the existence of EMIS activities and admitted experimental work on gas centrifuge systems, claiming they were for civilian research purposes. The team determined that the Iraqi EMIS program was committed to large-scale indigenous production of highly enriched uranium and that the capacity sought was not consistent with civilian research. The facility at Tarmiya could have enriched up to 15 kg of HEU (93%) per year. It also found that separator units and magnets could be made by Iraq.

UNSCOM 5 confirmed western suspicions of an undeclared nuclear facility at Ash Sharqat--a replica of the Tarmiya EMIS facility. Iraqis initially said that the plant was for plastic coating of equipment, but later admitted its true function when the inspectors asserted that the first explanation was nonsense.

¹⁴Ibid, p. 11, 12.

¹⁵Ibid, p. 13.

Iraq's centrifuge program was found to be less advanced, although successful single-machine trials had been run with UF₆ gas. According to the team report, "it seems likely that the full extent of the centrifuge work has not been disclosed."¹⁶

Other designated sites inspected included: the yellow cake extraction facility at Al Qaim; the natural uranium mine at Akashat; UO₂ and UCl₄ production facilities in the Mosul area; and the Al Qa Qaa high-explosive testing site. The latter facility was later identified as the main center for developing nuclear weapons triggering and detonation systems.

4.2.4 UNSCOM 6/IAEA 4.

Like its predecessor, the fourth IAEA team was called upon to verify a revised Iraqi declaration of nuclear materials. The Iraqi declaration acknowledged the reprocessing of fuel irradiated in the IRT-5000 reactor to produce a small quantity of plutonium. In response to questioning, the Iraqis admitted that they had additional irradiated fuel elements not yet reprocessed. To hide them from the first three inspection teams, the elements were placed on a truck and moved around within the boundaries of the Tuwaitha facility as the inspectors moved elsewhere. Later, during the fourth inspection, they were placed in an undeclared storage tank.

The inspectors established that the Tarmiya EMIS site had achieved the stage of initial industrial production, thus modifying findings of IAEA 2. Facilities where equipment had been manufactured for the EMIS project were inspected. The electric equipment facility had been sanitized by the time of the inspection. Iraq claimed that much of the dual-use equipment had been removed for use elsewhere in the Iraqi economy and was unavailable for inspection.

A primary objective of the inspection was to gather details on the Iraqi gas centrifuge program. A program plan was provided by the Iraqis, which indicated that no firm decision had been made on the centrifuge design and that the experimental phase had only begun. Production was not to start before mid-1993. The team concluded that this was a realistic schedule, in part, because members were convinced that Iraq has been and may still be receiving substantial outside technical assistance.

¹⁶UN Doc. S/22837 (July 25, 1991) para. 6.

When asked about the location of a centrifuge manufacturing plant the third nuclear team had been told was under construction, the Iraqis took inspectors to Al Furat, which was then fully inspected. Al Furat was where the primary Iraqi centrifuge production facility (set to have been opened in late 1991) was located. Iraq had managed to import key components and materials for manufacture--most of which were not on export control lists--including maraging steel and carbon fiber cylinders. The team also visited the Al Jezira UO₂ and UCl₄ feedstock plants (near Mosul). The UO₂ plant had been substantially damaged by concealment activities--such as the removal of flooring and ripping out of all equipment. Also, documentation had been removed. The plant had been "camouflaged" to avoid detection by removal of wastes to a tank farm instead of open evaporation tanks.

UNSCOM 6 determined that the Al Atheer complex, when finished, would have constituted "a complete and sufficient potential nuclear weapons laboratory and production facility within one common fence line."¹⁷ No conclusive evidence was discovered regarding weaponization activities, although the team observed the fabrication of exploding bridge wire detonators at Al Qa Qaa. Also, Iraq admitted importing dual-use diagnostic equipment that could be used in weaponization, as well as purchase abroad of hundreds of tonnes of HMX high explosive. The latter information was provided so late on the last day that the team was unable to pursue the issue at the time.

4.2.5 UNSCOM 14/IAEA 5.

This inspection was designed to follow up on activities and findings of previous teams. The primary objectives were: to verify seals placed on material and equipment; to determine (by non-destructive analysis) whether the material present was as declared; to remove most of the plutonium from Iraq; to take samples for destructive analysis; to establish a heavy-water inventory; and to assess the chemical enrichment program.¹⁸

4.2.6 UNSCOM 16/IAEA 6.

Acting on information from an Iraqi defector, the sixth IAEA inspection team found irrefutable evidence of a large-scale nuclear weaponization program, codenamed

¹⁷UN Doc. S/22986 (August 28, 1991) p. 14.

¹⁸UN Doc. S/23112 (September 25, 1991) p. 5.

Petrochemical Three (PC-3).¹⁹ A top-secret Iraqi report revealed that design work for the implosion-type device had taken place within the Al Atheer Project, a collection of nuclear explosive activities being conducted at Tuwaitha and elsewhere.

There were large numbers of catalogs and documentation which revealed the extensive procurement network for dual-use technology from abroad. Although most of the equipment is not subject to export controls, Iraq sought to minimize attention to its programs by purchasing through an extensive network of bureaucratic organizations and companies.

The surprise inspection of one of two designated sites (PC-3 administrative headquarters in Baghdad) resulted in the highly publicized "parking lot" confrontation between IAEA inspectors and Iraqi authorities. While the inspectors were ultimately permitted to depart with some of the relevant documentation, the Iraqis did seize much of the material. The inspection team claimed that the Iraqis withheld the most sensitive documents, thereby casting doubt as to whether the UN and IAEA would ever know the true extent of the nuclear weapons program.²⁰

4.2.7 UNSCOM 19/IAEA 7.

UNSCOM 19 was charged with investigating further the revelations of the previous inspection team. Iraqi authorities admitted that the nuclear program could have been modified for weaponization purposes "in the event that a political decision were to be taken to proceed in that direction."²¹ The seventh nuclear team confirmed that Al-Atheer was to be the center of the weaponization program. The IAEA inspectors also continued the investigation of the Iraqi enrichment program, particularly the gas centrifuge process, and carried on the work of the fifth team in piecing together an accurate inventory of all nuclear materials.

¹⁹A BW inspection team learned that a site associated with Al Hakam was code-named PC-2, which was claimed to be an oil refinery. This raises the interesting prospect that other portions of Iraq's weapons program are similarly named and that a search should be made for documentation associated with PC-2 and a possible PC-1.

²⁰UN Doc. S/23122 (October 8, 1991) p. 6.

²¹Letter from Dr. Abd al-Halim Ibrahim al-Hajjaj of the Iraqi Atomic Energy Commission (October 14, 1991), reprinted in UN Doc. S/23215 (November 14, 1991) p. 36.

The primary objective, however, was to achieve an overall understanding of the components of the Iraqi nuclear weaponization program. The team also assessed the Iraqi production of lithium-6 as an indicator of an possible interest in "boosted" devices. Destruction of enrichment equipment was initiated. A number of short-notice trips to designated sites was undertaken, but only one (the explosives testing center at Al Hadre) was determined to be part of the weaponization program.

4.2.8 UNSCOM 22/IAEA 8.

The eighth nuclear inspection investigated foreign procurement by Iraq of nuclear-related items; further assessed the extent of the weaponization program; proceeded with the destruction process of enrichment and reprocessing equipment; supervised the return of HEU fuel to the (then) Soviet Union; and finalized the inventory of nuclear materials.²² The team concluded that "all known facilities and sites involved in enrichment and weaponization in Iraq have been inspected."²³ While there was "no assurance" that the full extent of the Iraqi program was revealed, the inspectors recommended that IAEA activities shift gradually to monitoring.

4.2.9 UNSCOM 27/IAEA 9.

The main objective of the ninth team was to investigate information communicated by the German government regarding the clandestine acquisition by Iraq of 240,000 shaped ferrite parts for centrifuge stators, 10,000 pieces of ring sheet material, and a die-casting machine for the manufacture of coil rings for stators.²⁴ When confronted with the German evidence, the Iraqis also disclosed the procurement of 100 tons of maraging steel and a few thousand aluminum forgings, both of which could be used in centrifuge production. However, the Iraqis announced that these items had been destroyed or "rendered harmless." Visual inspections by the IAEA team appeared to confirm this claim.

²²UN Doc. S/23283 (December 12, 1991) p. 3.

²³Ibid, p. 4.

²⁴See UN Doc. S/23505 (January 30, 1992) p. 16.

4.2.10 UNSCOM 30/IAEA 10.

This inspection was aimed at examining a number of designated sites suspected in Iraq's secret nuclear program. Principal among these was the SAAD-13 State Establishment, thought (by UNSCOM) to be a possible location for an underground plutonium reactor. No evidence was found to back up this contention, although sensing equipment that might have detected underground activity was not available to UNSCOM in sufficient time to be used. Specialist support was also provided to an UNSCOM inspection of the central computer facility of the Iraqi Ministry of Industry and Minerals. No new activities were discovered in the course of the designated site inspections. The IAEA team discussed remaining discrepancies in the nuclear materials inventory with the Iraqis, checked seals at previously inspected facilities, and took additional samples.

4.3 IRAQ'S CONCEALMENT AND DECEPTION ACTIVITIES.

The UN/IAEA inspections of Iraqi nuclear facilities have been met with a consistent and systematic application of deceptive practices, concealment, and obstruction by Iraqi authorities. The general Iraqi behavior pattern has been to deny any cheating up to the moment they are confronted with incontrovertible evidence of their transgression. A report by IAEA Director General Hans Blix, dated January 20, 1992, summarizes Iraqi manipulation and misrepresentation in its nuclear declarations:

The response of Iraq to the inspection work of the IAEA has largely followed a pattern of denial of clandestine activities until the evidence is overwhelming, followed by cooperation until the next case of concealment is revealed. As a consequence of this behavior, it is not possible to be confident that the full extent of prohibited nuclear activities has been disclosed. Continuation of the inspected activities, in parallel with the monitoring programme, is deemed necessary.²⁵

The remainder of this section examines: 1) Iraqi manipulation and misrepresentation in formal declarations and documentation; 2) camouflage, concealment, and deception (CCD) schemes for secret nuclear sites, equipment, and material; 3) Iraqi obstruction in the inspection process; and 4) revealed vulnerabilities of the IAEA inspection system. The objective is to assess the inherent difficulties in enforcing a hostile party's compliance with UN directives to reveal the extent of its nuclear program and to prepare the dismantling/destruction of its nuclear weapons potential. Iraq's recalcitrant behavior

²⁵Text reprinted in UN Doc. S/23514 (January 25, 1992) p. 20.

over the past year represents a graphic case study in how to cheat on an arms control regime and the accompanying inspection process.

4.3.1 Manipulation of Declarations and Documentation.

4.3.1.1 False and/or incomplete declarations may be made. On April 18, 1991, Iraq issued its initial declaration on nuclear matters in response to UN Security Council Resolution 687. Iraq's message in the document was simple, direct, and false; it rejected the UN contention that it had a nuclear weapons program and gave a very incomplete list of equipment, materials, and facilities.

As the inspections revealed physical evidence of the nuclear-weapons program, Iraq altered its declarations verbally and in writing. Numerous corrections and confessions were made. For example, as part of the revised July 27th inventory, the team received details of the separation of about three grams of plutonium, which had not been declared to the IAEA, even though it took place in a safeguarded facility.²⁶

Iraq continued to deny that the purpose of its nuclear-technologies acquisition was for weapons. However, the IAEA surprise visit to a secret Iraqi Atomic Energy Commission (IAEC) building on the sixth inspection obtained conclusive documentary evidence of a nuclear weapons development program. The evidence documented Iraqi efforts to design and weaponize an implosion-type device, as well as experiments involving neutron initiators, high explosive lenses, and electronic firing sets.

4.3.1.2 Declarations may be used to limit inspectors' rights of access. In its first declaration, Iraq insisted that "monitoring shall remain confined to the materials currently declared and used with the knowledge of, under the supervision of and subject to the safeguards of the International Atomic Energy Agency."²⁷ Because Iraq acknowledged having only highly enriched uranium and other material already under IAEA safeguards at Tuwaitha, this would have limited inspections severely, had the Iraqi position been accepted.

²⁶UN Doc. S/22986 (August 28, 1991) p. 17. On September 20, 1991, the IAEA condemned Iraq a second time for the undeclared plutonium production.

²⁷Cited in UN Doc. S/23165 (October 25, 1991) p. 21.

4.3.1.3 Inspectors may be denied full documentation. The first nuclear inspection team discovered that extensive clearing operations had taken place at the suspect sites and that "in almost all cases documentation and records had disappeared and were not available."²⁸ In many cases, it was apparent from empty file cabinets and the telltale ashes of several "paper campfires" that the sites had been sanitized. The inspectors reported:

The team was particularly concerned by the fact that many Iraqi statements were not supported by any source documentation--production records of the fuel fabrication plant, nuclear material transfer records, reactor operation records, fuel history cards, etc. The Iraqi authorities claimed that these documents/records had been destroyed, but in the light of various observations (e.g. of empty but unburnt filing cabinets) the team does not consider this to be a credible explanation; moreover, one would have expected that, with a functioning national nuclear materials accounting system, the Iraqis would have kept duplicates of relevant documents at the IAEA's establishments.²⁹

In addition to denying documentation, verbal information was not provided by the Iraqis. For example, the eighth team (November 11-18) found Iraqi responses to questions on the weaponization program to be "vague and general."³⁰ They continued to stonewall regarding data on foreign suppliers and to remove or obscure manufacturer information (such as serial numbers) from relevant equipment.

4.3.1.4 Large-scale updates to declarations can be timed to disrupt the inspections and to limit their effectiveness. On July 7th, the Iraqis issued a revised declaration to the third IAEA team (which had only arrived on July 6th and was scheduled to stay until the 13th).³¹ Thus, Iraq attempted to exploit inspection time constraints by overloading the inspectors with a whole new data set covering the EMIS enrichment program. The fourth inspection (July 27-August 10) began much like the previous one: on the first day of the operation, the Iraqi representative submitted a letter containing a new list of nuclear material, including some heretofore undeclared items. While the Iraqis continued to stonewall on issues like foreign suppliers for the centrifuge program, they did produce a

²⁸UN Doc. S/22788 (July 15, 1991) p. 5

²⁹UN Doc. S/22986 (August 28, 1991) p. 19.

³⁰UN Doc. S/23283 (December 12, 1991) p. 4.

³¹UN Doc. S/22836 (July 25, 1991), paras. 1-2.

huge number of reports, detailed fabrication drawings, and computer printout records.³² However, Iraqi authorities consistently refused to supply production records for their EMIS facilities.

4.3.1.5 Documentation may be confiscated from inspectors. The Iraqis on one occasion confiscated all documentation discovered by an inspection team. During UNSCOM 16, Iraqi officials took documentation away for inventory and then failed to return the most sensitive, revealing items.

4.3.1.6 Incomplete documentation hampers verification. UNSCOM 19/IAEA 7 recorded difficulties in inventorying additional nuclear material declared on July 7th and afterward. This material--in the form of ore, uranium oxide, and chemical compounds--had inadequate documentation, labeling, and packing--conceivably an intentional Iraqi deception technique. Iraq declared several hundred tons of nuclear material in many forms, dispersed throughout Iraq in an apparent effort to conceal it from inspectors.

4.3.1.7 Credible, unlikely explanations may be offered. The Iraqi authorities had ready explanations for purchased foreign equipment explicitly identified by UNSCOM. For example, regarding two Japanese streak video cameras useful in weaponization testing, the Iraqis claimed that the cameras were employed solely for graduate student work on internal combustion engines at the Technical University of Baghdad.³³ The dual-use nature of these high-tech cameras makes it virtually impossible to disprove the Iraqi contention.

4.3.1.8 The need to declare an item may be "pre-empted" by dubious claims that the item has been unilaterally destroyed. UNSCOM 27/IAEA 9 (January 11-14) was tipped off by the German government about large shipments from Germany of undeclared equipment required in the manufacturing of gas centrifuges.³⁴ In response to these charges, the Iraqis admitted the procurement, but insisted that the entire stockpile of equipment had been turned over to the military and destroyed or "rendered harmless" through melting or crushing during a period from before the first inspection until June 1991. Iraq argued that, technically, it did not possess these items and was therefore under no obligation to

³²UN Doc. S/22986 (August 28, 1991) p. 3.

³³Ibid, p. 12.

³⁴UN Doc. S/23505 (January 30, 1992) p. 3, 5.

declare them, UNSCOM lawyers strongly disputed this view. As the IAEA inspectors reported, "this position suggests that the inspection teams will continue to have difficulty in uncovering and verifying the complete Iraqi programme."³⁵ The team was shown evidence of the destruction and dismantling operations in line with Iraqi calculations; for example, Iraq admitted importing 100 tons of maraging steel; flat, irregularly shaped ingots were displayed weighing approximately that amount.

4.3.2 Concealment Strategies.

The second critical element in the Iraqi nuclear deception plan was its expensive and sophisticated strategy for concealing sites, equipment, and material. A great deal of this strategy had been fashioned long before the Kuwaiti invasion. The Israeli air strike on the Osiraq (Tuwaitha) reactor in 1981 taught the Iraqis an important lesson about camouflage, protection, and dispersal of facilities. Extraordinary costs were incurred by Iraq both to build the bomb and to hide the process. Nuclear scientists lived and worked in their own contained communities and took extreme measures to avoid signals intelligence (SIGINT) intercepts. The result was that U.S. intelligence agencies had very little hard data on the program before the war.³⁶

4.3.2.1 Bombing provided a cover for dismantlement. Coalition bombing of suspected facilities provided the pretext for massive Iraqi clearing and dismantling operations designed to cloak nuclear activities. Prior to the first IAEA inspection, the extensive concrete reinforced floor of the damaged Nuclear Physics Laboratory (B80) at Tuwaitha had been removed, and by the time of the second inspection, the building had been totally leveled.³⁷ Other bombed facilities at Tuwaitha had been stripped of all accessible equipment. This equipment remains unaccounted.

4.3.2.2 Removal of security measures can be used to mislead inspectors. Prior to the arrival of the first nuclear inspection team, Iraq removed from the sites to be inspected the elaborate security that had been evident previously. Personnel, fences, guard gates, and

³⁵UN Doc. S/23505 (January 30, 1992) p. 10.

³⁶ See Elaine Sciolino, "Iraq's Nuclear Program Shows the Holes in U.S. Intelligence," New York Times, October 20, 1991, p. E5.

³⁷UN Doc. S/22788 (July 15, 1991) p. 7.

other measures were downgraded so that inspectors would get the impression that the facility was for industrial purposes, rather than military.

4.3.2.3 Materials may be removed before inspectors can access sites. The first two IAEA teams attempted to examine six other sites by short-notice challenge inspections:

At two of these sites, the Iraqi authorities denied the right of access for the purposes of inspection and removed materials even after the Chief Inspector had ordered that no material or equipment be moved from the sites [until] the inspections had been completed. Photographic evidence substantiated a strong case that the material which was moved was related to undeclared uranium enrichment activities.³⁸

Nevertheless, the inspectors did find first evidence of the EMIS program at Tuwaitha, Al Hamath, and Tarmiya. Key buildings at these sites underwent "unusually thorough demolition" after the first team's inspection, suggesting "an attempt to render difficult the identification of the activities and purposes of these buildings."³⁹

4.3.2.4 False explanations for items may be given. Iraq repeatedly gave false, alternative explanations for sites and equipment. For example, the EMIS facility under construction at Ash Sharqat was claimed by Iraq to be a factory for the plastic coating of equipment.⁴⁰

4.3.2.5 Facilities may be physically altered to inhibit inspections. At Tarmiya, the return irons and rails in the EMIS facility had been covered with concrete to hide them. The Iraqis also painted walls to impede sampling for uranium presence. They even ripped out electrical grids so that power usage could not be estimated. All relevant equipment at Tuwaitha, Tarmiya, and Mosul had been turned over to the Iraqi army for removal, destruction, or concealment. Fortunately, the end pieces, magnets, and vacuum chambers could not be destroyed completely, thereby permitting the team to estimate the size of the EMIS program.

In addition to the physical alteration of sites to foil inspections, there were efforts to change the appearances of buildings, during construction, to help prevent detection of their purposes. Since the Osiraq attack, according to an Iraqi radio broadcast, "the Iraqi Atomic Energy Agency has been following a policy of building basic, similar, and

³⁸UN Doc. S/22788 (July 15, 1991) p. 9.

³⁹UN Doc. S/22788 (July 15, 1991) pp. 10-11.

⁴⁰UN Doc. S/22837 (July 25, 1991) para. 14.

symmetrical buildings with the aim of camouflaging the basic, genuine building, protecting it from bombardment, and preparing the other similar basic building as an alternative to be resorted to in case the genuine, basic building is destroyed."⁴¹ Conversely at Sharqat, for example, key buildings that served similar functions to those at Tarmiyah were deliberately built in a different configuration to disguise detection by overhead reconnaissance.⁴²

4.3.2.6 Items may be "lost" in the civilian sector. To prevent equipment from being discovered or destroyed, the Iraqis transferred (without UN permission) much of the multi-use equipment at Tarmiya and Ash Sharqat to civilian industries.

4.3.2.7 Claims may be made that items have been destroyed. UNSCOM 14/IAEA5 was told that 2.2 tons of heavy water had been "lost" because of bomb damage to the storage tank. This has not been, and likely will not be, independently verified.

4.3.2.8 Emissions of facilities may be minimized and physical characteristics altered to prevent detection by national technical means. At the Mosul UO₂ production plant, waste materials were removed to a tank farm rather than sent to evaporating ponds in order to reduce the probability that the facility would be identified through overhead photography. This serves as a typical example of Iraq's actions taken as a result of their respect for satellite imagery.

4.3.2.9 Items may be mobilized on trucks to prevent their discovery. Two irradiated fuel cells were intentionally removed from the Tuwaitha reactor and reportedly moved around by truck to avoid detection by the first three inspection teams:

The fourth team was told that during the first inspection this truck was within the boundaries of the Tuwaitha facility and that it moved as the inspectors moved....This must count as one of the most potentially dangerous deception activities encountered so far by the inspection teams.⁴³

⁴¹INA report, July 17, 1991, cited in FBIS-NES-91-138 (July 18, 1991) p. 16.

⁴²Alec Krinsky, "Former Defense Official Rips IAEA," *JINSA Security Affairs*, January, 1992, p. 3.

⁴³UN Doc. S/22986 (August 28, 1991) p. 18.

4.3.3 Iraqi Behavior During Inspections.

Iraq has employed a strategy of cooperating with inspectors at times and obstructing them at other times. Generally speaking, the Iraqis tend to be more cooperative at the field level in IAEA activities relating to declared sites (where they know what the inspectors are going to find). However, during short-notice inspections of undeclared sites, they have been highly obstructive.

4.3.3.1 Inspectees may gather intelligence on the inspectors and their intentions. Some inspectors on the nuclear missions felt that they were under scrutiny by Iraqis for the purpose of determining where the inspectors were likely to go, what they had already discovered, and what they intended to report. Inspectors reported that, in addition to eavesdropping, their rooms and possessions were searched. The task of the Iraqis was made considerably easier, according to some inspectors, by the lack of consistent operational security measures by the teams.

4.3.3.2 Physical harm may be threatened if inspectors come close to discovering something the inspectee is keen to hide. Warning shots were fired in order to impede the team when there was risk of discovery of EMIS equipment being transported by convoy to avoid inspector detection. Also, Iraqis sometimes refused to permit UN helicopters to enter their national airspace, saying that physical safety could not be guaranteed.

At other times the threat was more felt than seen or heard. For example, in the parking lot siege, some inspectors felt that--absent the strong leadership of the team and the focus of international media on the incident--the Iraqis would have been much more aggressive. Even so, there were moments when the Iraqis appeared to be preparing to move against the inspectors. As one inspector noted, "We were moving in a manner that apparently suggested to the Iraqis surrounding us that something was up. They visibly reacted. We reacted to their reaction. Tensions rose. It was a situation in which things could have readily gotten out of hand, but fortunately did not. It shows that inspectors can be subject to danger when [the inspected country is] on the defensive."

4.3.3.3 To keep from being outmaneuvered, the inspectees may go one-on-one with the inspectors. Inspectors were able to increase the element of surprise whenever they moved quickly or without inhibition by Iraqis. This is how, for example, one inspector was able to observe and photograph the Iraqis moving nuclear equipment around a site by truck to elude inspectors. To help prevent such "accidents," the Iraqis increased the number of

"minders" accompanying inspectors and did not let UNSCOM or IAEA inspectors take the lead in moving from one site to another or touring on-site.

4.3.3.4 The quality of information in a reply may depend on the exactness of the question asked. A systematic lack of candor on the part of Iraqi officials was recognized by the inspectors. As one inspection report noted: "Experience has shown that oral questioning is insufficient for obtaining definitive statements and that very careful phrasing is required in order to convey precisely what is being asked."⁴⁴ Iraqi representatives would literally answer the specific question asked and would not normally volunteer additional data. If the question was not phrased correctly, the inspectors were likely to receive an insufficient or misleading answer. As one inspector commented, "Questioning the Iraqis was like the dance of the 7,000 veils."

4.3.3.5 If the inspection process takes a long enough time, money and political support for the process may run out. The Iraqis appear to be playing a crafty waiting game, depending on the UN/IAEA inspection process to exhaust itself. They are well aware of the financial difficulties of UNSCOM and the IAEA and of political difficulties of Western leaders (including President Bush). They have courted non-aligned members of the Security Council and proposed a "non-partisan" expert group to assess the situation. The Iraqis are betting that their intransigent attitude will eventually lead to the lifting or "easing" of the embargo before the final destruction of all weapons-related equipment. Iraq will then have the base on which to regain its regional power and prestige.

4.3.4 Vulnerabilities of Nuclear Verification.

From the forgoing analysis, it can be asserted that the IAEA inspection process-- despite the inspectors' efforts--was highly vulnerable to Iraqi efforts to thwart detection and verification. Inspectors unanimously felt that the inspections were too heavily dependent on satellite-gathered intelligence.

4.3.4.1 National technical means can be rendered less effective by deceptive practices. These vulnerabilities are particularly significant in the inspections under the Nuclear Non-proliferation Treaty, more so than in UNSCOM inspections. Iraqi concealment of its nuclear installations effectively concealed most of its work on EMIS enrichment, centrifuge enrichment, plutonium separation, and weaponization. It buried power lines,

⁴⁴UN Doc. S/23215 (November 14, 1991) p. 9.

physically altered buildings, scrubbed plant emissions, and a host of other activities. At this point, it is impossible to know whether even more--such as a plutonium production reactor--is hidden.

4.3.4.2 Human-source intelligence (HUMINT) provides the most useful insight into clandestine nuclear programs. When tipped off by HUMINT sources, the inspectors surprised the Iraqis and made significant discoveries about the nuclear program. However, the Iraqis have been particularly security-conscious and have threatened whole families of workers, minimizing their potential for defection. Also, contact between key people with information useful to the inspections has been very limited; only those trusted have been allowed to interact with the inspectors. It will be important to enhance HUMINT methods to understand intentions and to identify the internal workings of facilities.

4.3.4.3 The objectives of IAEA inspection are not effectively aimed at detecting noncompliance. IAEA inspections aim to confirm declarations and have little power to search for proscribed activities, even in declared facilities. As IAEA Director Hans Blix noted:

The negative aspect is that the system is not designed for finding hidden secrets. What can we do if a country hides important facilities? Our experience in Iraq, where we can move freely and have all possibilities to work, shows that we are still not sure we have found everything.⁴⁵

The means of detecting noncompliance were also limited by the IAEA's decision not to use nuclear engineers in all inspections. For example, Iraq was inspected by an electrical engineer in IAEA inspections prior to the invasion of Kuwait.

4.3.4.4 Being an inspector can enable an individual from a proliferant country to better defeat the inspection process. One Iraqi gleefully told the UNSCOM/IAEA inspectors that he had formerly been an IAEA inspector and, therefore, knew how to defeat IAEA inspections. This experience was invaluable in helping the Iraqis to create two sets of books on nuclear reactor operation--one for the IAEA, and another to keep track of illicit fuel irradiation.

⁴⁵Blix interview in Die Presse (of Vienna), January 30, 1992, p. 3, reprinted in FBIS-WEU-92-020 (January 30, 1992) p. 1.

4.3.4.5 Institutionalization of an inspections process can lead to a buildup of camaraderie with the inspected country that can be detrimental to the aims of the inspection. Several non-IAEA UNSCOM inspectors commented that some team members drawn from the IAEA--as well as some officials at IAEA Headquarters--were continually worried about upsetting the long-term relationship between Iraq and the IAEA. For example, IAEA inspectors initially opposed the mission of UNSCOM 16 (when documentation of Iraq's nuclear weapons capability was successfully seized). They said that it would not only anger the Iraqis and make future IAEA inspections less cooperative, but would make other nations like North Korea less willing to sign up to IAEA safeguards.

The fact that some IAEA inspectors were preoccupied with being non-adversarial to preserve a good relationship was seen by several inspectors as a serious drawback. It is therefore useful to consider whether a heavily institutionalized bureaucracy can avoid developing a stake in "good relationships" with the inspected country. One inspector suggested that the solution might be to have the IAEA conduct the routine inspections, and have an ad hoc commission set up to handle challenge inspections. The commission should have a rotating set of inspectors who would not necessarily expect to visit a given country multiple times and would, therefore, be less likely to worry about ruffling feathers.

Another expert has suggested having a rotating set of inspectors, strengthened by a core group that has a set membership. This core group could then provide corporate memory, while the new members would bring fresh perceptions and analyses. A problem with this solution is that the core group might dominate the newcomers and acculturate them to a non-adversarial inspection style, or even exclude them.

4.3.4.6 Sporadic inspections cannot assure that reactor facilities are not being misused. Iraq used its safeguarded facility to irradiate fuel for reprocessing. This was despite a bi-annual inspection, which revealed nothing and deterred international suspicions by giving Iraq a "clean bill of health."

4.3.4.7 Results of inspections may be useful to proliferants, and therefore should be protected. Some information discovered in the course of inspections would be useful to any country undertaking to develop nuclear weapons. For example, information on centrifuge designs were obtained in Iraqi documentation. These data are now in the IAEA. Any country that endeavored to obtain them likely could do so. Several inspectors suggested that only nuclear-weapons states be allowed as inspectors in situations where nuclear-weapons design information is likely to be uncovered and that

such information, if found, be turned over to one or more of the five nuclear-weapons states for safekeeping.

4.3.4.8 Verification can be disadvantaged when competing bureaucratic institutions share inspection responsibility. In the Iraq nuclear inspections, responsibilities were shared between UNSCOM and IAEA. Ultimately, this led to conflict because of the differing priorities and agendas—subtle as they are—between the two. UNSCOM's first consideration is the implementation of Resolution 687 and the demilitarization of Iraq. The IAEA has this as a priority, but also must consider the effect of the Iraq inspections, for example, on the willingness of other countries like South Africa to undertake safeguards in the future. Also, to some extent, the two organizations were responding to different pressure groups: UNSCOM is lobbied strongly by the advanced industrial countries; the IAEA is heavily influenced by developing countries.

4.4 CONCLUSION.

Iraq systematically concealed its nuclear weapons program and deceived inspectors who were attempting to uncover and destroy that capability. At present, there is no way to determine how much of the Iraqi nuclear capability remains intact and how quickly that which has been disassembled could be reassembled. One of the best examples of the continuing problem is the issue of whether Iraq has an underground plutonium production reactor.

There are additional reasons why many inspectors suspect that Iraq has such an underground reactor. Iraq obtained a very large, Italian-supplied fuel fabrication facility that can make hundreds of elements per year. Other imports included large amounts of graphite, graphite milling equipment, and uranium. There is little practical or economic rationale for such imports, other than for a reactor.

One of the techniques used by Iraq to acquire nuclear technology was to enter negotiations with a supplier country for provision of a facility.⁴⁶ For example, between 1982 and 1986, Iraq opened three sets of discussions on purchase of an underground nuclear reactor: with the Soviet Union, a French-Belgian consortium, and China. After

⁴⁶This approach also was used to obtain technical help on chemical exchange enrichment.

obtaining plans, answers to questions, and a variety of technical data, Iraq cut off the talks, citing the effort as "too expensive." In their eagerness to win a contract, the foreign companies revealed significant information. Iraq probably obtained whatever it needed to design and build the underground facility itself. If it did so, that facility has not yet been discovered.

Iraq has been attentive to building its own indigenous capabilities not only to reduce reliance on outside suppliers, but also to reduce the observability of its programs. It has been extremely careful to hide all aspects of the nuclear program. Unless there is a significant breakthrough in terms of additional human-source intelligence, it is unlikely that any additional nuclear capabilities will be uncovered.

SECTION 5

BALLISTIC MISSILE INSPECTIONS

This section is divided into three parts: a description of the Iraqi ballistic missile program, an outline of the UNSCOM missile inspections, and lessons from the missions relevant to implementing inspection regimes. Particular attention is focused on the techniques used by Iraq to camouflage, conceal, and deceive as a means of protecting its missile program.

5.1 IRAQI BALLISTIC MISSILE CAPABILITIES.

Iraq acquired FROG and Scud B launchers and missiles from the USSR in the early 1970s.⁴⁷ Thereafter, Iraq began a program to produce ballistic missiles indigenously and by 1990 had an impressive infrastructure for developing, producing, deploying, and using ballistic systems. This effort included both liquid and solid-fueled missiles.

One sophisticated missile under development was the Badr-2000, which was a virtual copy of the Condor II being developed by a joint venture of Iraq, Argentina and Egypt. The Condor/Badr 2000 program probably began about 1984. The Iraqis, under Project 395, were building indigenous production and testing facilities. These facilities were located at four major sites: Saad 16, the missile R&D bureau, in Mosul; a solid-fuel plant at Al Qa Qaa, near the city of Al Hillah, forty miles south of Baghdad; a plant for manufacturing fuselages at Al Fallujah; and the an-Anbar Space Research Center, a launch and testing facility near the city of Karbala. As of 1990, the Badr 2000 had not reached the testing stage, although parts were being procured for assembly.

From February 1988 through Desert Storm, the Iraqi missile program's operational capability was centered on the Al Hussein liquid-fueled missile, which was derived from the Soviet Scud. The impetus for development of the Al Hussein appears to have been the Iranian Scud attacks on Baghdad. The Iraqis were unable to strike Tehran with their own Scuds in reply because Tehran is located much farther from the Iran-Iraq border than is Baghdad. So, the Iraqis increased their Scuds' range through a crash program in 1986-1987. They did this by reducing the Scud payload, and increasing the capacity of the fuel tank. The range of the modified missile, Al Hussein, was increased to about 400 miles,

⁴⁷ FROGs are listed in the Iraqi inventory by the IISS Military Balance as early as 1974-1975 (p. 34); Scuds make their appearance in the 1975-1976 edition (p. 34).

more than double the Scud B's 180-mile range. Although no certain figures are available for the number of missiles fired by Iraq at Iran, some experts have estimated 189 Al Husseins hit Iranian targets between February and April 1988.⁴⁸ An attempt to enhance the Scud's range still further resulted in a missile called the Al Abbas. This program is believed to have ended in failure.

The conversion of Scuds and the manufacture of Scud components was carried out under Project 144 at Al Taji, a northern suburb of Baghdad, and at a number of other sites. The Iraqis had built a number of plants to give them redundant capabilities in converting Scuds to Al Husseins, and were aiming to produce the entire missile indigenously.

Iraq's missile developers also were working on a space-launch vehicle, the first stage of which was tested in December 1989. This three-stage vehicle, called Al Abid, was constructed with a first stage consisting of five Scud boosters strapped together, with another Scud serving as a second stage, and a smaller third stage of unknown design. The Iraqis also claimed to be developing a number of other missiles, including the Tammuz and Al Hijara.⁴⁹ Yet another Iraqi program gave Soviet SA-2 missiles (SAMs) a surface-to-surface configuration; these SSMs were named Al Fahd 300 and Al Fahd 500.

The Iraqis also had a unique program to develop artillery pieces to lob a rocket-assisted warhead hundreds of miles. These "superguns" were the brainchild of Canadian ordnance expert Gerald Bull. Two guns of 350mm and two of 1000mm caliber were planned, and one 350mm gun had been assembled and was in the process of testing in 1990. The weapon was never fired in anger before it and the others were destroyed by UNSCOM.

Finally, the Iraqis had acquired or developed a number of shorter-range missiles, including the Sakr-200, SS-21, Ababil, FROG 7, and Laith. Because these short-range programs were not proscribed by UN Resolution 687, they will not be described here.

⁴⁸ W. Seth Carus and Joseph S. Bermudez, Jr., "Iraq's Al-Husayn Missile Programme, Part 2" Jane's Soviet Intelligence Review, June 1990, p. 242.

⁴⁹ Letter dated 23 January 1992 from the Chargé d'Affaires A.I. of the Permanent Mission of Iraq to the United Nations addressed to the President of the Security Council (New York: United Nations, January 24, 1992, UN Document Nr. S/23472), p. 32.

It is important to note the lack of publicly available information about Iraq's missile programs, particularly prior to Desert Storm. Before Iraq's use of the Al Hussein missile against Iran, it was not known that Iraq had successfully upgraded the missile's capability. At first, many observers speculated that Iraq had obtained outside technical expertise to accomplish the feat, but it is now clear that the capability was indigenous. The December 1989 test of the first stage of a satellite launch vehicle caught Western intelligence agencies by surprise. Additionally, it was not known prior to the onset of UNSCOM inspections whether Iraq had made a CW warhead for its missiles. These and other examples demonstrate that western analysts have consistently underestimated the extent of Iraq's missile capabilities, or have not known about them. In this context, it is quite possible that--in the face of successful Iraqi concealment and deception--Western intelligence information is still very deficient and that, therefore, the inspections will be limited in what they can discover.

5.2 UNSCOM MISSILE INSPECTIONS.

Resolution 687 required Iraq "to accept the destruction, removal, or rendering harmless, under international supervision"... of (*inter alia*) "all ballistic missiles with a range greater than 150 kilometers, and related major parts, and repair and production facilities." Iraq was ordered to submit a declaration of the locations, amounts, and types of these missiles and to agree to "urgent, on-site inspection." The Resolution directed the UN Secretary General to appoint a Special Commission to carry out the on-site inspections, including inspections of sites not declared by Iraq, to receive proscribed items, and supervise their destruction by Iraq. Iraq also was ordered not to use, develop, or construct ballistic missiles with a range greater than 150 km.

5.2.1 UNSCOM 3.

The objective of UNSCOM 3, the first ballistic missile inspection, was to inspect, verify, and destroy declared missiles and support equipment at seven sites at Al Taji, Habbaniyah, and Rasheed Camp. The inspection ran from 1-7 July 1991. The materials were successfully verified and destroyed. At Al Taji, many undeclared missile components were discovered. Some were intact; others, damaged or destroyed. Also, it appeared that production equipment had been removed prior to inspection.

A subteam of UNSCOM 3 inspectors also visited a site outside of Al Taji where five decoy Scud launchers were known by Western intelligence to be located. The Scud

launchers had been replaced with launchers for FROGs, an allowed missile. The Iraqis might have learned of the impending inspection from site diagrams that had been handed out to inspectors before the visit. The team had not been well-briefed on security and several inspectors were careless with the materials. The team had arrived on Sunday and the visit to the launchers was not until the following Saturday, so there was ample time for the Iraqis to learn of the plans. Additionally, the team announced the intention to visit a building where fuel-tank end domes were made (which was near the launcher site and therefore would serve as a reason to be at the location), and then delayed the visit by 48 hours. Thus, the Iraqis knew the inspectors would be near the launchers and might have guessed that they would be an inspection target.

5.2.2 UNSCOM 10.

The second missile inspection was labeled UNSCOM 10, despite having occurred before UNSCOMs 6 through 9. This is because UNSCOMs 6 through 9 had already been scheduled under those numbers when this quick-reaction missile inspection was initiated.

UNSCOM 10 was conducted on less than a day's notice at Al Taji. The mission was narrow and direct: to inspect at one location 11 undeclared Iraqi missiles and missile storage supports that were not inspected by the first UNSCOM missile inspection. The missiles, which turned out to be Scud decoys, were successfully located by the team and, at UNSCOM direction, destroyed by the Iraqis.

While on UNSCOM 10, the three inspectors received a facsimile message telling them of Iraqi activity that appeared to be burying equipment. The team found nothing, but later learned that three airframes had been seen at the site.

5.2.3 UNSCOM 8.

UNSCOM 8, the third ballistic-missile inspection, ran from 8 to 15 August 1991. The UNSCOM team inspected the Habbaniyah Solid Motorcase Production Facility and an undeclared Scud assembly plant, both at Fallujah. The team also inspected the undeclared Al Radwan Scud assembly plant at Batra, the Shahiyat Liquid Engine RDT&E Facility at Al Rafah, and several other missile production and support facilities. They also surveyed supergun sites (the superguns had been declared in July) at Jabal Hamrayn and Al Dujayl.

The team destroyed some proscribed equipment at the Al Hussein and Badr 2000 missile facilities. The Iraqis protested the planned destruction of other equipment they regarded as dual use; these items were sealed and inventoried, with a final decision on destruction to be obtained from the Special Commission. A letter was soon sent from the Commission to the Iraqis requiring the destruction of certain of these items.⁵⁰

5.2.4 UNSCOM 13.

UNSCOM 13, the fourth ballistic-missile mission, took place 6-13 September 1991. It sought to inspect fixed missile launching sites in the "Western Zone" of Iraq, destroy the equipment found there, and also inspect some other sites in Iraq. This aspect of the mission was unsuccessful because the Iraqis denied the inspectors the use of their own (United Nations) air transport to visit the Western Zone.

The stand-off over use of UN helicopters left free time with which inspectors could visit other sites around Baghdad. An attempt was made to verify destruction of oxidizer tanks at Al Dujayl and Abachi (they had been declared during UNSCOM 8). The presence of toxic oxidizer forced the team to defer the verification for safety reasons.

At one location, four missile transporters that had been cut up under a previous inspection were found having been spot-welded together. These and other items, including an undeclared triple-missile support, were destroyed.

5.2.5 UNSCOM 18.

After the Special Commission was permitted to use its own helicopters, the fifth ballistic-missile inspection did visit the Western Zone three weeks later than initially planned. The fifth mission took place from 1 to 14 October 1991. It inspected declared fixed launch sites and despite the fact that most of them were declared as "destroyed," ordered additional destruction of equipment there. The team also visited some undeclared fixed sites which had been partially completed, and ordered destruction of these sites. In addition, the team verified destruction of some proscribed items at the supergun sites.

⁵⁰ Report by the Executive Chairman of the Special Commission established by the Secretary General pursuant to paragraph 9 (b) of Security Council resolution 687 (1991) addressed to the Secretary-General (New York: United Nations, 25 October 1991, UN Document Nr. S/23165), p. 32.

At one inspected site, drums of chemicals were seen through the doors of a warehouse. The team did not inspect these chemicals, although the warehouse was put on the list of sites for later examination by CW inspectors. One site, an electronics factory, scheduled for inspection, was not visited. The team went on a tour of an historic mosque and minaret because it was believed that there was insufficient time to conduct a complete, thorough inspection of the site.

5.2.6 UNSCOM 23.

The sixth team, UNSCOM 23, verified the Iraqi destruction of the launch pads in the Western Zone, and inspected several other sites, including the Al-Kindi Establishment in Mosul, the Salahuddin Establishment in Al Dour, and, near Baghdad, the Nasr Establishment and the Al-Mutawakil project. UNSCOM 23 took place from 1 to 9 December 1991.

5.2.7 UNSCOM 24.

The seventh team, UNSCOM 24, operating from 9 to 17 December, inspected the Haditha Ammunition Depot and depots in the Western Zone, and several undeclared sites, including the Directorate of the Baghdad Police, the Al-Zawra Sports Club, and the Al-Karkh Education directorate. Inspections of those three sites yielded no undeclared items.

Inspection of another site yielded eight Scud-carrying trailers, including six undeclared trailers and two that had been previously "destroyed," but which had been welded together and used to carry short-range FROG missiles. The team ordered their complete destruction.

At another site the team found that some 22 supergun barrel sections and related items had not been destroyed according to UNSCOM specifications, and directed that procedures be followed correctly.

5.2.8 UNSCOM 28.

The eighth missile team, UNSCOM 28, sought to enforce the Special Commission's ruling that Iraqi ballistic-missile-production equipment, which had been identified in earlier inspections, be destroyed. The mission was led by Ambassador Ekeus, and presented the Iraqis with a list of items to be eliminated. In Iraq from 21 to 29 February,

1992, the team returned to New York without having secured Iraqi acquiescence. The threat of renewed hostilities with the US and UK led the Iraqis, after "technical discussions" at UN Headquarters on 8 and 9 March, to agree, on 19 March, to eliminate the items and to declare 89 additional ballistic missiles and eight mobile launchers.

5.2.9 UNSCOM 31.

UNSCOM 31, from 21 to 30 March, was the ninth ballistic missile inspection team. It was a large team of 29 inspectors and 6 support personnel. Having analyzed weaknesses of past teams, UNSCOM designed the thirty-first mission to be comprehensive and thorough. It divided into small subteams so that inspectors could be dispersed and a great deal could be accomplished in a short time. Virtually every building at Taji and Tikrit--both of which are facilities that cover approximately 30 square kilometers--was inspected. Buildings and warehouses at other sites, ten in all, were thoroughly searched for missile relevant documentation. Also, the mission initiated destruction of missile production equipment, including solid-propellant mixers and computers.

UNSCOM 31 also verified the unilaterally destroyed ballistic missiles declared by Iraq on March 19, 1992. The Scud-type missiles, which had been buried over four sites, were dug up and serial numbers were taken from the rocket motors for matching with Scuds known to have been supplied by the USSR.

Throughout the mission, exceptional emphasis was placed by the inspection team on operational security. All sites were given numbers in the 5-day preparatory briefings in Bahrain and no one referred to any site by name during the mission. No paperwork which could have given away the sites to be inspected was carried by inspectors. Helicopters overflew and, at times, hovered over the sites being inspected to assure that no equipment was being secretly removed by Iraqis.

Despite the thoroughness and security of the inspections, nothing undeclared was found. In one case, a building that had been targeted was found to be totally empty. Either the intelligence information was not good, or was outdated.

5.2.10 UNSCOM 34.

The tenth mission, UNSCOM 34, running from 13 to 21 April, completed the mission of UNSCOM 28: verifying the destruction of the Iraqi missiles, launchers and production

equipment. The mission was particularly successful because it had a Russian member who was a Scud missile production expert. The Iraqis were cooperative and did not resist destruction of some equipment that had been left off of or inappropriately categorized on the annexes to their declaration of equipment to be destroyed.

The UNSCOM inspection process is continuing. Although much undeclared support equipment has come to light, the United Nations has not yet discovered any undeclared missiles. Despite their recent declaration of 89 missiles and eight mobile launchers, the Iraqis may still possess "as many as several hundred missiles"⁵¹ and large amounts of production equipment for the Al Hussein and Badr 2000. Moreover, never have the Iraqis provided a convincing overview of their ballistic-missile program as called for in UN Security Council Resolutions 687 and 707, or for future plans as called for under Resolution 715.

5.3 LESSONS RELEVANT TO INSPECTIONS IMPLEMENTATION.

Many of the lessons and observations described in forgoing chapters are relevant to ballistic missile inspections as well. They are summarized briefly in the concluding chapter. Some are reiterated here because the examples or the emphasis given by missile inspectors varies from other types of inspections.

5.3.1 Team Selection.

5.3.1.1 Leadership and managerial capabilities are paramount for the team chief.

Inspectors repeatedly made the point that the team chief did not need to be an expert on missile technology; familiarity was enough. Much more important was the ability to lead, which included understanding the mission and its extent of authority, ability to manage time so that the mission could be accomplished, and ability to subdivide the team and delegate.

5.3.1.2 U.S. nationals should be inspection leaders only in exceptional situations. In the case of Iraq, the United States was viewed by most nations as being very hardline and

⁵¹ Robert M. Gates, Testimony before the House Armed Service Committee, Defense Policy Panel, (Mimeograph) March 27, 1992, P.6.

inflexible. To some nations, this meant that any U.S. national leading the team could not be fair.

Some U.S. inspectors felt that U.S. team leaders, with few exceptions, were not as effective as they would have been as team members because they overcompensated. That is, to prove that they were fair, they were even less rigorous and firm with Iraq than would have been an inspector from a different country. They took the Western-culture stance of "innocent until proven guilty." Many inspectors pointed out that such an approach was not legitimate when it was evident that Iraq had a missile program and the task at hand was to find and destroy that missile capability. While some observers have suggested that proper training of inspectors could assure the proper attitude on the part of inspectors, others have commented that the problems associated with using U.S. nationals as team leaders cannot be removed via training.

5.3.1.4 Missile inspectors ideally should have hands-on experience with the same type of missile to be inspected. Ideally, missile teams should be composed, insofar as possible, of inspectors who have actually used, produced, or developed the type and model of missile being inspected or sought out. For example, expert Russian team members were sometimes present and helpful in identifying unique and obscure Scud-related equipment. Other inspectors were familiar with the Badr-2000 program through past experience, which improved the inspections' findings. Inspectors who had missile experience but with other than the types inspected were not as adept at identifying parts or machinery.

5.3.1.4 The type of missile expertise that an inspector has must be considered in formulating the team. Teams should be tailored to specific inspections: missile design, research, testing, production, storage, or operations experts should be included as required. Sometimes insufficient expertise was present on a team. For example, on UNSCOM 28, galvanizing equipment was found at the Karama electronics facility. There were no specialists on the team who knew enough about it, so it had to be designated for a subsequent team to inspect.

5.3.1.5 Large teams should be sub-divided. If it becomes necessary to take a number of experts larger than 12 (not including accompanying support personnel), the team is cumbersome. As one inspector noted, "It is like a second-grade field trip. Anytime you stop the bus, it takes an hour to get on the road again."

If larger teams are needed to accomplish a given mission, they should be broken up into sub-teams, so they can be more carefully managed and more work can be done. It

does, however, require more support personnel, transport, planning, and other resources. The costs increase in direct proportion to personnel. In the case of UNSCOM 31, for example, there were 29 inspectors plus 6 support personnel; the mission cost more than \$400,000.

5.3.2 Team Mission.

5.3.2.1 Experiences in on-site inspections under one treaty are not always applicable to inspections under another treaty. There are two major differences between on-site inspections under a treaty such as the U.S.-USSR bilateral Intermediate Nuclear Forces (INF) Treaty, for example, and those in Iraq. The first is that, in the bilateral regime of INF, the allowed activities are specified with great precision and clearly defined in written protocols. By contrast, the UN mandate allows an open-ended process by which activities are worked out by on-the-scene bargaining and rights are established by taking initiative rather than awaiting definition through negotiation.

This difference in approach caused some difficulties during the initial missile inspections. Inspectors who had experience in on-site inspections for the INF Treaty were unwilling to take actions that had not been specified clearly. For example, Resolution 687 set out the UNSCOM charter to identify and destroy Iraq's weapons of mass destruction and the capability to make those weapons. Some inspectors therefore thought that when missile production equipment was encountered, it should be destroyed. In contrast, inspectors with INF experience were not willing to undertake destruction because it had not been specified in the team's orders. While this was later worked out and the destruction objective clarified, this represented a recurring problem: actions that were not clearly specified as allowable were frequently either disallowed or challenged by the Iraqis and/or the inspectors themselves.

The second difference is the effect of reciprocity. In INF monitoring, each party can do to one another whatever has been done to it. Under a multilateral treaty or arrangement, it is less clear to the inspected party against whom to retaliate. Also, in the unique case of the Iraq inspections, the inspectee has been defeated in war and has no ability to undertake reciprocal acts.

5.3.2.2 The team chief, who sets the parameters of the inspection, may take a very narrow or minimalist approach. Some team leaders restricted the inspection even more than the Iraqis would have. On some missile inspections, it was the team leader, not Iraqis, who disallowed photographs. Rigid lines were drawn regarding what constituted a

missile inspection; anything that was nuclear, chemical or biological would not be included. For example, a missile team inspecting some Iraqi warehouses saw barrels of chemicals through the warehouses' front doors, but were not allowed by the team leader to enter the warehouses to inspect because it was not clear that they were missile-related chemicals.

Likewise, the team chief can focus the inspection on a particular goal to the exclusion of other objectives, even ones that have been specified in writing by the overall inspection authority (UNSCOM). On some of the initial ballistic missile inspections, the chief limited the team's activities to verifying Iraqi declarations and did not emphasize the mission's "other goal" of looking for activities that might be in violation of Resolution 687.

5.3.2.3 Time management is a significant issue. Several inspectors on different teams felt that missions were cut short or executed inadequately due to time constraints. Often work started about 0900 and finished at 1500 or 1600. Short workdays were a function of many variables, including: availability of transport, daylight limitations in winter, finishing one site without time to move and begin inspection of another, and Iraqi attempts to consume time.

In some cases inspectors complained that the team chiefs did not manage time well. For example, on more than one inspection, time off was taken for visits to tourist sites, including a mosque and Babylon. Chagrined inspectors noted that the lax schedules were promoted by the Iraqis and always came at the expense of the mission. In the rush to complete the missions within tight time constraints, some sites were omitted, some only selectively inspected (particularly Taji).

5.3.2.4 Standards should be established regarding adequate destruction. Illegal Iraqi equipment, such as Scud missile transporters, was destroyed in ways that might have been sufficient under INF. However, these methods were not destructive enough to prevent the Iraqis from reassembling and re-using these items. Just as high western standards concerning production of equipment and weapons should not be assumed to be universal, western standards of what constitutes unusable equipment should not be applied.

5.3.2.5 Confirmation of claims by the inspectee should be sought. During UNSCOM 3, Iraq offered the opportunity for inspectors to verify the destruction of a piece of machinery used in the production of end-domes for Scud fuel tanks. A similar offer was

made during UNSCOM 18, concerning some missile TELs. Although the Iraqis may have actually destroyed the items as claimed, the fact that inspectors did not verify leaves open the possibility that the destruction was inadequate and/or Iraq will assume that verification will be lax.

On another occasion, the team leader, despite urging from team members, did not request a written statement from the Iraqis, which would have recorded their oral claim that certain missile production equipment had been shifted to civilian industry.

5.3.2.6 Teams should have a planned guide to action for each inspection. Some of the missile inspections did not have carefully planned itineraries. Instead of being laid out in New York, targets were planned when the team was in Bahrain, or even in Iraq. Moreover, changing itineraries in-country created a security problem as well as a management problem, especially before the installation of secure communications. And sometimes too many sites (as many as 18 in one day) were scheduled for inspection to allow thorough examinations of the facilities. Afterward, the Iraqis were able to, and have, argued that the sites have already been inspected, although they were barely glanced at by the early inspection teams. A plan, however, should not be so rigid that additional sites could not be inspected if intelligence suggested doing so.

5.3.2.7 Hesitation by teams is likely to be exploited. Inspectors must be willing to take quick action and set precedent. UNSCOM 8 had cataloged the machinery at the Badr 2000 facility, but had not destroyed it because the team chief did not view that as part of the specific mission. Later, when UNSCOM wanted the equipment destroyed, nine months of argument with the Iraqis ensued. Much of the equipment that is dual-use still has not been destroyed.

5.3.2.8 Security should be emphasized. Security should be emphasized not only in training, but also by the team chief during the inspection. Some of the ballistic missile inspectors do not recall any security briefings. On several of the missions, information about the undeclared sites to be visited may have been compromised. In one case, some undeclared missile launchers were replaced with allowed FROG launchers, in the period between the arrival of the team in Iraq and the actual inspection of the site.

Team members were given line drawings of the sites to be visited. These and other paperwork were left in hotel rooms by some inspectors. Also, conversations among inspectors in the hotels often concerned the mission, its findings, suspicions, and intended targets. Team members often referred to their upcoming activities by using simplistic

code language that, in the opinion of several inspectors, was totally transparent. These discussions probably were overheard. The Iraqis may have also learned much from the conversations among inspectors during the inspections, and may have installed eavesdropping devices in team members' rooms and work places.

5.3.3 Logistics and Related Issues.

5.3.3.1 Secure communications can be vital to the success of a mission. Insecure communications hampered at least one challenge missile inspection. During one UNSCOM missile-inspecting mission, the team was called, from New York, and directed to search a field at the Taji camp, because questionable Iraqi activities (apparently something was being buried) were taking place there. Due to the insecure communications, exact coordinates of the site were not given, and the exact activity to be investigated was not stated. When the site was reached, the team saw what appeared to be stabilizer marks for an excavator, and scrapings of earth. The Iraqis were directed to dig two trenches, but nothing was found there.

After the inspection, discussions between the team and the United Nations revealed that the UN had found that the Iraqis were attempting to bury three Scud-type missiles in raised berms; there were stabilizer marks for the crane to lift them. But the team had not looked at the berms. The Iraqis did not have the chance to bury the missiles; they and their equipment left the site when they found UNSCOM wanted to inspect it--leaving only the marks on the ground. Secure communications would have improved the speed with which the inspectors reached the site, by telling them the exact equipment and location.

5.3.3.2 Inspection teams need to be able to discuss issues on site, but out of earshot of the inspectees. Differences in opinion and information, as well as upcoming plans, need to be discussed by the team on site. Initial inspections frequently had discussions in front of the Iraqis, which gave them an advantage and inhibited team members from expressing their thoughts. Later missions insisted on time alone, which made a significant improvement in team interaction and efficiency of the inspection.

5.3.4 The Role of Intelligence.

5.3.4.1 Sales records from companies doing business with the inspectee can provide useful intelligence. The inspection process benefits from an informed inspectorate. In some cases, UNSCOM inquiries to countries who sold machinery to Iraq yielded lists of

missile-related items sold, including serial numbers. Such information has supported detailed questions of the type more likely to result in useful answers from the Iraqis.

5.3.4.2 Iraqis understand how to hide facilities and activities from national technical means of intelligence collection. Iraqi officials have seen satellite photography; some was shared with them during the war with Iran. They are also aware of the details based on U.S. satellite imagery of Libya's Rabta CW facility. They repeatedly demonstrated their awareness of the need to hide their missile assets from overhead photography.

5.3.4.3 Intelligence information has been crucial to maintaining political support for UNSCOM. Photo intelligence has been key to mobilization of political forces behind UNSCOM. Photos prove intelligence assertions, and galvanize political support for tough action. For example, photographs taken of intact Iraqi missile plants were instrumental in getting the United States and other Western countries to threaten Iraq with bombing unless the Iraqis agreed to destroy the facilities.

5.3.4.4 The "dry hole phenomenon" made some inspectors reluctant to inspect additional undeclared sites. When inspectors went to an undeclared site that obviously was unconnected with a weapons program--such as a prison--the Iraqis would laugh and make jokes. Some inspectors were sensitive to this and did not want to leave the impression that Western intelligence was poor. They also did not want UNSCOM to look foolish. As a result, there was some hesitation about going to sites for which there was not very high confidence that items would be found. For example, after one "dry hole," the team did not go on to the second undeclared site.

5.3.4.5 The inspections process teaches any observer about the nature and limits of Western intelligence. The Iraqis on at least two occasions appeared to be probing the level of UNSCOM's intelligence capabilities. The first example, mentioned above, involved the undeclared Scud-type TELs that were replaced with FROG TELs by the time the inspection took place. In another instance, the Iraqis had some eleven undeclared Scud-type missiles partially buried in "graves" and covered with branches. The UN sent a special inspection team (UNSCOM 10) to that site to inspect them. The Scuds were found to be superb decoys, though still proscribed items, and so were destroyed. The Iraqi excuse was that they had emplaced them before the war and forgotten about them. However, it is known that they had been emplaced during the war, and the branches covering them had been changed--they were too fresh to have been placed there during the war. Whether the Iraqis were purposely testing UNSCOM's intelligence capabilities by these actions is not known for certain, but clearly the

experience has given them practical information about UNSCOM's monitoring capabilities.

Assuming that some elements of Iraq's missile program remain undetected by UNSCOM, Iraq will learn which of its concealment and deception methods worked, and which did not. Along these lines, inspectors should never reveal the way in which undeclared items are found.

5.3.5 Declarations.

5.3.5.1 Declarations have been incomplete and have changed over time, with no serious repercussions. The Iraqis initially declared only their liquid-fueled Al Hussein and Scud missiles and some related facilities. Over time, they revealed more facilities, including those for the solid-fueled Badr 2000 (Condor II) and their "Superguns." Iraq declared components sufficient to manufacture just five Badr 2000 missiles, but parts were found for 60 such missiles. Because Iraq was preparing to make up to 60 missiles, it is likely that they were beyond the prototype stage, yet they do not admit to being so. Also, it seems unlikely that Iraq would only work on the first stage of a two-stage missile; it would work on both in parallel, yet no evidence of a second stage has been found.

The long list of additions made by Iraq to its declarations also includes some missile manufacturing facilities, dummy launchers and missiles, and numerous minor items such as fuel containers. It was only after UNSCOM asserted that it had evidence that the declarations made thus far were not complete that Iraq volunteered, on March 19, 1992, that it had unilaterally destroyed eight mobile launchers and 89 Scud-type missiles. Some of the missile parts had been buried after destruction.

The political costs for inaccurate declarations have been low. The international community has not responded with condemnation or punishment. The most serious consequence has been the continuing persistence of UNSCOM and the demand by the UN that Iraq submit a full and final complete declaration. In event that Iraq does not do so, the most likely effect will be continuation of the economic embargo.

5.3.5.2 Declaration requirements must be specific and clear. Resolution 687 does not require Iraq to declare its missile R & D facilities. Thus, it may be that a ballistic missile production facility, even if discovered, is not subject to destruction.

5.3.5.3 Language problems can cause misunderstandings in declarations, written and verbal. Poor translations can mislead inspectors and may even be used by the inspectee

to intentionally misrepresent. "Horizontal test unit" was a phrase that was used without raising any red flags with the inspectors. Eventually, it was learned that the phrase was a poor translation from the Arabic and really meant "training Scud."

On occasion, Iraqi machinery was mis-described, in an apparent effort to hold onto it. For example, a missile nose-cone mandrel was described as a lathe, and listed as general-purpose equipment.

5.3.5.4 Locating declared equipment may be impossible. It was apparent from inspections of Iraqi missile production facilities, for example at Taji under UNSCOM 3, that many buildings had been stripped of equipment. Inspectors found very little equipment even in destroyed buildings. In areas containing "generic" machine tools, the jigs and dies relating to production of specific items, such as ballistic missile parts, had been removed. The Iraqis claimed that the machinery had been turned over to the civilian economy, and that as military people, they had no further knowledge of it.

Although twelve tons of Supergun fuel were declared, only one was physically present. The Iraqis claimed to have destroyed eleven tons of the fuel on grounds that it was dangerous (although on other occasions the Iraqis demonstrated a lack of concern about dangerous or explosive substances).

5.3.5.5 Iraq tended to correct declarations only when evidence was uncovered. An example of an Iraqi lie concerns chemical-weapons work at one of the sites inspected on UNSCOM 3. The Iraqis had said that no CW work was performed there. However, one of the first buildings inspected had liquid fill containers for Scud warheads. Then, an artillery shell was found with CW agent present, and a line in which 122mm mortar shells were being filled with CW was found. When confronted with the obvious facts, the Iraqis simply agreed that they did CW work at this site.

Another example concerns a building at Project 144. It was claimed not to be a missile shop, but it was full of Scud parts: dollies, actuator rods, and end domes from fuel tanks.

Iraqis also lied about the function of an electronics factory outside Baghdad, Karama Electronics. First, the Iraqis said that automotive work was carried out there. Then, they admitted that T-72 gyros were made there. Finally, when the team discovered proscribed items, they admitted that work on Scud gyros had been performed there.

5.4 LESSONS REGARDING ABILITY TO DETECT NONCOMPLIANCE.

Some techniques used by the Iraqis to control information were the same, regardless of the type of inspection. Thus, many of the lessons outlined in the section on chemical weapons verification also were mentioned by ballistic missile inspectors. They are repeated here, to some extent, because the examples of how they apply in the case of ballistic missiles is instructive.

5.4.1 Inspectee Control of Information.

5.4.1.1 Only "trained" Iraqis interacted with inspectors. Inspectors were exposed only to a limited set of people who were clearly trained in what to say. Answers were repeated to some questions word for word. Some inspectors speculated that the Iraqis studied their own videotapes to learn more about the inspections and to prepare other Iraqis how to interact with the UNSCOM team.

In some cases, inspectors felt that they were not interacting with the "real" officials. For example, the person represented as the manager of site 144 got buildings and their functions confused. Keeping the inspectors from talking to the actual workers and managers was an effective way to guarantee that no information could be leaked.

5.4.1.2 Lunches and dinners were opportunities for the Iraqis to build sympathy for their positions on issues and to pump for information. Many of the inspectors did not like the MREs and preferred Iraqi food. The Iraqis knew this and, in the evenings, would offer to serve lunch on the next day if the inspectors would indicate in what vicinity they might be (when the site was to be undeclared). Although this did not work, there was much information exchanged during the lunch and dinner interactions. The extent to which this influenced inspectors' viewpoints is incalculable, but several inspectors felt that the Iraqis were successful to some extent.

5.4.1.3 Opinions of individual inspectors were used to try to influence decisions of the team as a whole. During UNSCOM 34, for example, Iraqis engaged individual inspectors in side conversations in order to obtain their views on issues such as whether a particular piece of equipment should be destroyed. If there were an inspector whose view coincided with that of the Iraqis, that opinion was then later used to try to influence the overall decisions by or direction of the inspections.

5.4.1.4 Some inspectors practiced self-censorship out of fear of endangering individual Iraqis. Several inspectors were deeply impressed by the fact that one Iraqi apparently

disappeared--and may have been executed--for being too forthcoming. Even if the Iraqi were not executed, the inspectors perceived that he had been, and there was some fear that pushing other Iraqis into giving information could endanger them as well. As one inspector noted, "It made us not want to interview the real workers and to not push anyone who seemed to be open with us."

5.4.1.5 Iraqis developed superb communications on whereabouts of inspectors. The Iraqis monitored the UNSCOM teams' travels. One inspector estimated that the Iraqis were ready within ten minutes to deal with an UNSCOM inspection of an undeclared site. In this particular case, there were no site line drawings, so the Iraqis could not have seen them by accident. After telling the Iraqis that they were going to the site, the inspectors arrived there within ten minutes. The director of the facility was ready to greet them on arrival and refreshments were ready to be served. It is possible that the Iraqis had set up radio communications and had alerted the facility management that the inspection was imminent.

5.4.1.6 Some missile teams felt pressure to "not be combative like the nuclear teams." In UNSCOM 18, the Iraqis thanked the ballistic missile inspectors for their "professionalism," and pointedly contrasted their behavior with the nuclear inspection team (UNSCOM 16). The Iraqis added that they knew the ballistic-missile inspectors wouldn't be so nasty, a subtle appeal to "gentlemanly" behavior. Several inspectors noted that the tactic was effective, particularly on team leaders.

5.4.2 Concealment and Removal.

5.4.2.1 Finding missile production equipment may have resulted from its recent use. Some inspectors felt that successes in finding missile equipment should not lead to the conclusion that such items would be easily found in future inspections. The Iraqis apparently were fine tuning their Al Hussein missile, possibly to mate it with a CW warhead. Tests occurred as late as December 28, 1990, and, much of the equipment was still in place when the war began. Thus some of it was damaged by bombing and still on site when inspectors arrived.

5.4.2.2 Concealment of equipment is assisted by buying in bulk and dispersing it. Iraq did not buy single items, even if only one was needed. Purchases were duplicated and items bought in quantity, often under cover. For example, some Scud rocket motor production equipment was bought under different accounts and by different bureaucratic organizations. Placing it under differently administered programs helps assure that if

inspectors uncover one program, they will not discover all of the items. It is clear that some equipment is still dispersed in this manner. This is known because, in some instances, countries and companies from which purchases have been made have revealed their records. Iraqi declarations do not match.

5.4 CONCLUSION.

The United Nations Special Commission has undertaken ten ballistic missile missions to Iraq to date. While these missions have damaged the Iraqi missile program, Iraq has not complied fully with UN Resolution 687. The Iraqis failed to declare proscribed items, have carefully controlled information flowing to the inspectors, are believed to be hiding 200-300 Scud-type missiles and missile production equipment, and have otherwise tried to prevent the inspection process from functioning smoothly. Only when military action was threatened did Iraq acquiesce in the destruction of certain illegal items and declared some hitherto unacknowledged missiles.

The final level of success of the UNSCOM missile inspection effort remains to be seen—it is not yet complete. Clearly it has disrupted and retarded Iraqi missile developmental programs and production to some degree, and resulted in the destruction of about 150 existing Scud-type missiles. Iraq's ability (or inability) to regenerate its missile program will depend in great part on how much production equipment the UNSCOM missions will be able to locate and destroy. Iraq will retain its technical personnel and know-how, including documentation. Even more, the ability to rebuild will depend on the commitment of the international community to monitoring pressure and scrutiny on Iraq. Missile programs are visible, particularly in the production and testing stages. It will be difficult for Iraq to do either if it is being closely monitored.

SECTION 6

IRAQI CIRCUMVENTION OF EXPORT CONTROLS

A primary policy tool used by the United States, Europe, and Japan to stem proliferation of weapons of mass destruction has been export controls. There are three regimes in existence: nuclear, chemical, and missile. The effectiveness of each regime depends on variables such as whether the technologies controlled are dual-use, membership in the regime includes most suppliers, equipment necessary is easily manufactured, and/or the countries with developing weapons programs have significant indigenous capabilities.

This section is not designed to evaluate the effectiveness of each regime, per se. It is intended to examine the efforts made by and successes of Iraq in circumventing the regimes.

6.1 NUCLEAR WEAPONS: THE NUCLEAR SUPPLIERS' GROUP (NSG).

Shortly after the Indian nuclear test in 1974, a group of nuclear supplier states met in London to consider tightening and expanding restrictions on nuclear exports. The proximate cause of the meeting was the Indian nuclear explosion of May 1974, which pointed up many of the flaws in the Nuclear Non-Proliferation Treaty's (NPT) control mechanisms. Under the Zangger Committee rules, the NPT signatory supplier nations had agreed to a "trigger" list of nuclear materials and equipment to non-nuclear weapon states. These items could only be exported if the recipient country permitted International Atomic Energy Agency (IAEA) safeguards on the items purchased and on any fissile material produced by these items. The NPT specifically requires safeguards on exports of:

- a) source or special fissionable material; and
- b) equipment or material especially designed or prepared for the processing, use or production of special fissionable material.

These controls were not sufficient to stop the Indian nuclear program. In addition, the United States and other supplier states were concerned that France, a major exporter of nuclear materials and technologies, was not a party to the NPT. After extensive secret

negotiations, the NSG or "London Club" (including France) agreed in 1978 to an expanded trigger list. The signatories also required assurances that:⁵²

- a) controlled items would not be used in any nuclear explosive device;
- b) adequate physical protection would be guaranteed by the purchasing party;
- c) safeguards would apply to facilities for reprocessing, enrichment, or heavy-water production, utilizing transferred items;
- d) suppliers would exercise "restraint" in the transfer of sensitive facilities, technology, or weapons-usable materials;
- e) for transfer of enrichment facilities or technologies, recipient nations would agree not to produce greater than 20 percent enriched uranium (without notification of the supplier and IAEA); and
- f) any retransfer of these items by recipient nations would be subject to the supplier's consent and be covered by the same guarantees as the original transfer.

6.1.1 Iraqi Procurement Strategies.

Iraq's strategies for developing nuclear weapons were determined to a significant extent by the availability of foreign-supplied technologies and materials. Because electromagnetic isotope separation (EMIS) technologies were not on the NSG list, Iraq pursued EMIS. This enrichment process was deemed outdated by the NSG and, therefore, an unlikely course for a proliferant (and thus would not attract attention, according to Iraqi analysis). The components required are primarily dual-use and fairly easily manufactured, and the technology is detailed in unclassified literature. While the casting and rough machining of large EMIS components were done at foreign foundries, most of the other steps in the process were undertaken at Iraqi facilities.⁵³

For the gas centrifuge program, the Iraqis chose not to attempt large-scale foreign procurement of many components because of risks associated with export control constraints. Rather, Iraq attempted to put together an indigenous centrifuge production capability through the purchase of multi-use component technologies and materials. The

⁵² "Guidelines for Nuclear Transfers," reprinted in U.S. Congress (Congressional Research Service), *Nuclear Proliferation Factbook* (Washington, D.C.: GPO, 1985) pp. 488-489.

⁵³ See eighth IAEA inspection report, UN Doc. S/23283 (December 12, 1991) p. 9.

objective was to assemble a centrifuge production facility that would be maximally independent of supplier controls.

One reason for Iraq's early abandonment of the gaseous diffusion process may have been realization of the heavy potential dependency on foreign suppliers involved in such a program.⁵⁴ Other components needed for a nuclear explosive were dependent on imports, however, and Iraq had no choice but to pursue them abroad; it could not make them indigenously.

One of the most sensational incidents was the customs "sting" operation in which U.S. and British authorities succeeded in stopping a shipment of high-speed capacitors used to trigger detonation of the high explosive which squeezes nuclear materials to generate a nuclear explosion. Iraq had sought to disguise its intent by listing the end-use as air conditioning equipment.⁵⁵ A similar ploy was used in an attempt to import high-temperature furnaces from the United States. Although these furnaces can be used to cast nuclear device components, Iraq claimed they were for the manufacture of prosthetics.⁵⁶

There were a number of other tricks employed by Iraq to hide its imports. Iraq used non-military state establishments and companies as buyers or contractors; placed orders for equipment directly with manufacturers and indirectly through intermediaries; and bought foreign companies that manufactured the items it needed. The Iraqis set up "front companies" to undertake purchases and compartmentalized their supply and advice systems, so that no one foreign company (or individual) had a complete picture of the nuclear program.⁵⁷ This strategy also gave unscrupulous suppliers an alibi of deniability. When a critical piece of equipment was available from a supplier, the Iraqis often bought large quantities. The ninth IAEA team reported:

Faced with tighter and tighter export controls, they proceeded with the large procurements as opportunities presented themselves, even though they had no immediate plans for the materials in the quantities ordered.

⁵⁴See UN Doc. S/23215 (November 14, 1991) p. 19.

⁵⁵Jeff Gerth, "6 Held in Britain in Scheme to Send Atom Gear to Iraq," New York Times, March 29, 1990, p. A1.

⁵⁶R. Jeffrey Smith and Benjamin Weiser, "Commerce Dept. Urged Sale to Iraq," Washington Post, September 13, 1990, p. A1.

⁵⁷See UN Doc. S/23122 (October 8, 1991) p. 5.

Their strategy was to buy whenever there was an opportunity and simply run the risk that some material might not be used.⁵⁸

One reason that Iraq encountered success in its efforts to import nuclear-related equipment was its membership in the Nuclear Nonproliferation Treaty. Because Iraq was a full member of the NPT and had negotiated a safeguards agreement with the IAEA, some supplier countries were less suspicious of Iraq. As Paul Leventhal observes:

...the NPT, the principal bulwark against the spread of the bomb, actually facilitated the supply of very sensitive items--research reactors, bomb-grade uranium fuel, and equipment for processing plutonium--to a rogue state. Iraq laid to rest a long-standing belief that a state will not join the NPT for the purpose of cheating.⁵⁹

Nevertheless, outright Iraqi violations of NSG guidelines were minimal. The production of a small amount of plutonium in the Soviet-made research reactor represented a breach of their IAEA safeguards agreement and thus a transgression of NSG controls. In the gas centrifuge program, the one procurement item on the NSG trigger list was the carbon fiber rotors obtained from Germany. However, Iraq was making a serious effort to produce its own rotors out of maraging steel, thereby circumventing controls.⁶⁰

The UN list of 13 companies supplying the Iraqi nuclear program demonstrates the ambiguities involved in the trade in multi-use technologies. Nearly all equipment identified by the eighth inspection team was multi-purpose and therefore not explicitly covered by export controls. Most of the items listed apparently were to be utilized in the production of gas centrifuges, not as components of the centrifuge system itself. However, "the presence of application-specific fixtures removes most doubt as to its intended use."⁶¹ These fixtures could have been added by the Iraqis themselves.

For example, the German firm H & H Metallform Maschinenbau und Vertriebs GmbH, exported a flow forming machine with application-specific mandrel, expanding

⁵⁸UN Doc. S/23505 (January 30, 1992) p. 9.

⁵⁹Paul L. Leventhal, "Plugging the Leaks in Nuclear Export Controls: Why Bother?" *Orbis*, Spring 1992, p. 172.

⁶⁰UN Doc. S/23215 (November 14, 1991) p. 19.

⁶¹IAEA Press Release No. 1198/IK/77 (December 11, 1991) p. 1.

mandrel and rollers.⁶² This equipment could have been used for making centrifuge rotor tubes. While such a transfer may be in violation of German export laws, it is not a clear breach of the NSG guidelines. The H & H sales do reflect a callous disregard for Western security interests, and company protestations of being misled by the Iraqis are hard to believe. But the case does point up the difficulty in controlling these technology transfers through legal sanctions while the German government recently passed a stringent export control law, the efficacy of this action may well be undermined by the dissolution of trade barriers among the European Community members at the end of 1992.

Dupont, the one American company cited, had shipped \$30,000 worth of Krytox, a nuclear grade fluorinated vacuum pump oil, to Iraq. The company protested being singled out, given the size (less than 30 gallons) and nature of the transaction, and the fact that it had received an export license from the Commerce Department in February 1989. Dupont described the product as "a fluorinated lubricant widely used in the electronics and chemical processing industries."⁶³ Here again, an uncontrolled multi-use item is in question.

The Iraqis attempted to convince the eighth team that dual-use equipment should be spared:

The Iraqi authorities, anxious to salvage what they can, made a number of suggestions as to how specific equipment could be rendered useless for enrichment applications and still be available for other uses (with appropriate monitoring). In some cases, the suggestions were accepted for further evaluation; in other cases they were not and an immediate decision to destroy was taken.⁶⁴

The ninth IAEA inspection was initiated by a communication from the German government, indicating that 240,000 shaped ferrite parts for centrifuge stators, 10,000 pieces of ring sheet material, and a die-casting machine for manufacture of coil rings

⁶²See UN Doc. S/23283 (December 12, 1991) p. 13. See also David Albright and Mark Hibbs, "Iraq's Shop-Till-You-Drop Nuclear Program," Bulletin of the Atomic Scientists, April 1992, pp. 27-37.

⁶³See Paul Lewis, "Du Pont Says U.S. Cleared Export of Item Used in Iraqi Bomb Effort," New York Times, December 12, 1991.

⁶⁴UN Doc. S/23283 (December 12, 1991) p. 17.

were supplied by an unnamed German company (or companies).⁶⁵ The Iraqis admitted this purchase, as well as procurement of 100 tons of special maraging steel for production of centrifuge rotors and rotor internal fillings, but revealed that all of these acquisitions had either been destroyed or "rendered harmless." They also had imported 384 tons of aluminum alloy tube extrusions and aluminum forgings for manufacture of the vacuum housings and molecular pumps. Later the Iraqis claimed that these had been melted down. This could have been part of the pre-inspection effort to hide the undeclared centrifuge program. The ninth team reported:

The Iraqi centrifuge design conforms substantially to early west European designs. However, no component is identical in design; all showed evidence of intelligent adaptation and development based on sound principles. A number of capable scientists and engineers were involved in the Iraqi centrifuge development effort, but it is unlikely that they were able to make the observed design modifications without outside help.⁶⁶

While relying on such advice, the Iraqis were "clearly trying to minimize the extent of foreign involvement." Once more, no violation of international export controls was apparent. A German Foreign Ministry official said it was unclear whether the companies involved could be prosecuted under German law.⁶⁷

In all of these projects, Iraq exploited the extensive open literature on nuclear weapons development, and blueprints of key Western technologies and facilities were obtained by all possible means. These intellectual resources will remain in Iraq once the inspection teams have left and will provide Saddam Hussein with a scientific and technical base for reconstructing his programs.

6.1.2 Supplier Regime Responses.

In March 1991, the Nuclear Suppliers Group held its first full meeting since its inception at The Hague to discuss the inclusion of dual-use items under its controls; a working group was established to define such a list. At a subsequent meeting in Warsaw from March 31 to April 3, 1992, the 27 supplier-nations formally agreed to extend the

⁶⁵See text of letter in UN Doc. S/23505 (January 30, 1992) Appendix I.

⁶⁶UN Doc. S/23505 (January 30, 1992) pp. 6-7.

⁶⁷Paul Lewis, "Iraq Admits Buying German Materials To Make A-Bombs," New York Times, January 15, 1992, p. A1.

NSG trigger list to cover trade in nuclear-related dual-use commodities and technologies. Most of the additions were already on the Nuclear Referral List controlled by the U.S. Government. The United States had, in fact, been pressuring its NSG partners to incorporate dual-use items since the late 1970s.

According to the Commerce Department, U.S. exporters can now operate on "a 'level playing field' when competing against foreign suppliers for commercial sales."⁶⁸ The Commerce Department also stressed the point that countries (e.g., Iraq) who were unable to acquire especially designed or prepared equipment and materials were now in the market for dual-use items. The Warsaw Agreement effectively placed controls on the latter items. Four additions were made to the NSG list explicitly because of Iraqi exploitation of EMIS enrichment technologies: vacuum pumps; direct current high-power supplies (100 V or greater); high-voltage direct current power supplies (20,000 V or greater); and electromagnetic isotope separators.⁶⁹ Furthermore, the NSG member-states agreed:

The object of these controls should not be defeated by the transfer of component parts. Each government will take such action as it can to achieve this aim and will continue to seek a workable definition for component parts, which could be used by all the suppliers.⁷⁰

They added that "[t]he transfer of 'technology' directly associated with any items in the List will be subject to as great a degree of scrutiny and control as will the equipment itself, to the extent permitted by national legislation."⁷¹ These provisions demonstrate, to a certain extent, the impact of the Iraqi nuclear revelations. In the past, some nuclear supplier states (like France and Germany) had resisted U.S. efforts to expand the list. In addition, all Western suppliers now endorse the principle of full-scope safeguards, requiring a recipient country to open all its nuclear facilities to IAEA inspectors.

⁶⁸U.S. Department of Commerce, "Nuclear Suppliers Group Nuclear-Related Dual-Use Commodity Control Regime," press release, n.d.

⁶⁹See U.S. Department of Commerce, "Annex: List of Nuclear-Related Dual-Use Equipment and Materials and Related Technology," January 17, 1992, Section 3-5.

⁷⁰Ibid, p. iii.

⁷¹Ibid, p. iii.

6.1.3 Conclusion.

Iraq's circumvention of nuclear export control regimes has elicited the first real tightening of nuclear supplier guidelines since 1978. Still, the potential for nuclear proliferation persists. Since Iraq retains the expertise and blueprints to resuscitate its nuclear weapons projects, it will be incumbent upon the UN and IAEA to establish an expensive and intrusive on-site monitoring system. Even then, the Iraqis could continue their R&D efforts at secret facilities outside the inspectors' purview. It was only because an Iraqi defector pinpointed specific sites that the UN/IAEA inspection teams were able to uncover the EMIS, gas centrifuge, and weaponization programs.

Furthermore, Iraq maintains its list of secret suppliers and could conceivably tap into materials and technologies from the emerging supplier nations. These countries (like China, India, and Brazil) are not members of the NSG and do not now abide by its guidelines. As a consequence, transfers from these suppliers do not come under the IAEA full-scope safeguards. Even among Western suppliers, it is still questionable whether illegal nuclear sales can be stemmed, especially given the dropping of trade barriers within the EC by the end of 1992. Moreover, the disintegration of the Soviet Union has increased the possibility for covert leakage of nuclear materials and technologies to the Middle East. Iraq's nuclear program may be stymied for the moment, but, given Saddam Hussein's hegemonic ambitions and financial resources, plus the unknown extent of personnel and plans for the nuclear program, the Iraqi nuclear proliferation threat is far from terminated.

6.2 BALLISTIC MISSILES: THE MISSILE TECHNOLOGY CONTROL REGIME.

The Missile Technology Control Regime (MTCR) is a non-binding international agreement to "limit the proliferation of missiles capable of delivering nuclear weapons." It was signed by seven countries on April 16, 1987 as a result of a U.S. initiative. A U.S. interagency task force began to study the problem of missile proliferation in 1981; in 1982, secret talks were initiated with U.S. allies.⁷² Negotiations took several years; the United States moved unilaterally to abide by the restrictions in 1985. The MTCR

⁷²Jürgen Scheffran and Aaron Karp, "The National Implementation of the Missile Technology Control Regime—the US and German Experiences," in Hans Günther Brauch et al, eds., Controlling the Development and Spread of Military Technology (Amsterdam: Vu University Press, 1992), p. 236.

originally included only the "G-Seven" industrial nations: the United States, Great Britain, (West) Germany, Canada, France, Italy, and Japan. No additional states joined the Regime before 1990, but by 1992, 22 countries have become members.⁷³ Since the 1987 signing, follow-up MTCR meetings have taken place about every eight to 18 months.

The regime's guidelines break exports into two categories: Category I and Category II. Exports regulated under Category I include complete rocket and unmanned air-vehicle systems (cruise missiles and drones) capable of delivering a 500-kilogram payload to a range of at least 300 kilometers; complete subsystems such as rocket stages, motors and reentry vehicles; and specially-designed production facilities.⁷⁴ At an MTCR meeting in Oslo June 29 - July 2, 1992, a decision was made to reduce the allowed payload so that missiles capable of delivering chemical and biological warheads will also be restricted. Transfers of production facilities for any Category I item "will not be authorized."⁷⁵

Category II guidelines regulate export of propulsion components, propellants, and related technologies; structural composites and other structural materials; pyrolytic technologies; flight and navigation equipment; flight control systems; avionics; launch and ground-support systems; missile computers, software, and converters; "stealth technology;" testing facilities and equipment; and protection against nuclear effects. Specially-designed production facilities for many of these items are also regulated under Category II.

Permission for transfer of items in Category I is strongly presumed to be denied. Transfer is only allowed given binding assurances from the receiving state that: the items are used for stated purposes only and not modified or reproduced without prior permission from the supplier; and no retransfer of the items (or replicas and derivatives) without prior permission from the supplier.

Category II items are mostly dual-use and are less tightly controlled than Category I exports. Criteria for assessing the acceptability of export of Category II items include the

⁷³Members aside from the original seven include Australia, Austria, Belgium, Denmark, Finland, Greece, Ireland, Luxemburg, the Netherlands, New Zealand, Norway, Portugal, Spain, Sweden, Switzerland.

⁷⁴The White House, Missile Technology Control Regime. Announcement by the White House, April 16, 1987, MTCR Equipment and Technology Annex, pp. 2-3.

⁷⁵Ibid., p. 2.

potential recipient's nuclear proliferation efforts; the usefulness of the transfer in developing a nuclear weapons delivery system; capabilities of the recipient's missile and space programs; assessment of the end-use of the transfers; and the applicability of relevant multilateral agreements.

Major weaknesses of the MTCR have been its limited language and goals, its non-binding character, and lack of key adherents. For example, prior to the 1992 MTCR meeting in Oslo, the MTCR was geared to stopping missile exports to potential nuclear proliferators; only missiles capable of delivering nuclear warheads were covered. Under the Regime's terms, were China an adherent to the MTCR, the Chinese sale of CSS-2 missiles to Saudi Arabia would have been legitimate, because there is no evidence that Saudi Arabia is trying to acquire nuclear weapons. Also, sales of items related to space launch vehicles are allowed. France has publicly declared its right to sell missile technology to peaceful foreign space programs.⁷⁶

Moreover, the Regime has no center for collecting and exchanging information, for policing the Regime's provisions, or for verification and compliance. Each member state is left to apply the Regime's provisions with its own laws and bureaucracies. For example, the United States administers the MTCR guidelines under the Export Administration Act (EAA) of 1979, and the Arms Export Control Act (AECA) of 1976.

Some key missile-supplies states do not participate in the MTCR. Most notably, North Korea and Russia are major missile exporters. Russia has agreed to supply India with \$250 million in cryogenic rocket engine technology. Other states of the former Soviet Union may also present missile proliferation threats.

The Government of France coordinates Regime administration issues, such as dissemination of meeting reports. The MTCR operates through standard diplomatic channels. National officials share intelligence with regard to potential violations and punishments. Intelligence is only shared between full members, and not with associate states such as Russia and China.

⁷⁶Kathleen C. Bailey, "Reversing Missile Proliferation," *Orbis*, Winter 1991, p. 10.

6.2.1 Iraqi Circumvention Techniques.

Despite the existence of national export controls and the MTCR, Iraq was able to develop an impressive ballistic-missile capability due to several factors, divided into two groups. The first includes Iraq's active efforts:

- An elaborate network of front companies was formed in the west, to facilitate export (often through re-export) of proscribed items.
- Iraq funded a missile development project in a nonsignatory state (Argentina), which had the added benefit of drawing attention away from itself (though, conversely, it may highlight Iraq's interest in a ballistic missile program).
- Western businessmen illegally cooperated with Iraq in circumventing national laws and the MTCR;
- In an unforeseen move, Iraq pursued a novel technology in extended-range artillery, including the Supergun project.
- Offices to manage much of the Iraqi acquisition operation were located overseas, sometimes in countries, such as Switzerland, which had not signed the MTCR.
- Inferior but effective substitute materials were used by Iraq in its programs as necessary.

The second group of factors for Iraq's success are the inherent weaknesses of the national and international export-control machinery:

- Iraq missile acquisition dated from the mid-1970s; domestic enhancement and development programs began in the early-to-mid 1980s, before the MTCR's institution.
- Until 1990, only the original seven nations had signed the MTCR; many suppliers to Iraq were not signatories;
- Iraqi missile designers and engineers were trained overseas; the MTCR does not and cannot control training.
- Some key missile proliferators have still not joined the MTCR (e.g., North Korea) while others have chosen a policy of selective enforcement (e.g., Russia);
- Although required by the MTCR, bureaucracies assigned to implement the Regime's guidelines were not in place by the time of signature, so some proscribed exports did not attract notice;

- Even if an export-control bureaucracy was in place, it sometimes failed to enforce national laws or the Regime's guidelines or interpreted them too narrowly;
- Re-export was a worthwhile option, because national laws vary in language and enforcement;
- As with any export control regime, little can be done to halt an indigenous program and may in some cases enhance it by forcing independence from trade.

In the mid-to-late 1980s, Iraq had two major programs for long-range missiles. The first of these involved enhancements to the liquid-fueled, Soviet-supplied SCUD-B missile, leading to the Al Hussein, Al Abbas, and Al Abid missiles. The second program aimed at acquisition of a two-stage, solid-fueled missile, the Badr 2000. The Iraqis also had a unique program, "Project Babylon," to acquire long-range artillery pieces capable of lobbing a warhead hundreds of miles.

Iraqi missile development and acquisition strategies in these programs were elaborate. They entailed two major elements: the securing of expertise and production overseas, and the development of domestic capabilities to develop and produce ballistic missiles.⁷⁷ Lists of missile and supergun supplier-countries are provided (see Tables 6-1, 6-2, and 6-3). The list in Table 6-1 is not complete since it excludes the USSR; if all the details of Iraq's procurement effort were known, some Eastern European countries, plus China, would probably make the list as well, and the number of companies in some western countries would probably be higher.⁷⁸

Iraq is believed to have first received Scud missiles from the USSR in 1976. During the war with Iran, Iraq needed a missile capable of hitting the Iranian capital of Tehran. Denied longer-range missiles such as the SS-12 by its usual supplier, the USSR, Iraq

⁷⁷An interesting book discussing this issue is The Death Lobby: How the West Armed Iraq, by Kenneth R. Timmerman (Boston: Houghton Mifflin, 1991).

⁷⁸The PRC reportedly helped Iraq modify its Scuds and complete a Scud production facility. Anthony Cordesman, "Iraq and Weapons of Mass Destruction," The Congressional Record, April 8, 1992, p. S5063. Another report asserts that upgraded Iraqi Scuds were assembled at Al Fallujah largely by East German and North Korean specialists. "My Cousin in Baghdad," Der Spiegel (in German), January 28, 1991, pp. 24-27, translated in Joint Publications Research Service, Arms Control (JPRS-TAC-91-004), 12 February, 1991, p. 46.

embarked on a program to enhance its Scuds. The Iraqi Scud-upgrade program comprised several "projects," numbered 124, 1728, and 1545. These were initiated in 1986 at the latest, before the MTCR had been signed. In one phase, Iraqis, assisted by Brazilian, West German, and French engineers, carried out research on reverse-engineering and enhancing the range of the Scud. Some research and development work was performed by foreign companies overseas. One or more Iraqi Scuds were reportedly shipped to a Brazilian Air Force research organization for this purpose. Iraqi engineers had been receiving training from Brazilian engineers.⁷⁹ Brazil is not a member of the MTCR.

Table 6-1. Suppliers for Iraq's ballistic missile programs countries and number of companies⁸⁰ (estimated from press reports)

Argentina	5	Monaco	2
Austria	10	Netherlands	1
Brazil	5	Spain	1
France	3	Sweden	2
Germany	65+	Switzerland	4
Italy	4	United Kingdom	9
Jersey (UK)	1	United States	11

To upgrade its Scuds, Iraq acquired a broad range of parts from foreign suppliers. Many of these components appear to have come from Germany, and included gyroscope parts, used in missile guidance, and turbo pumps used in the propulsion system.⁸¹ Often, the acquisition of equipment overseas was concealed by claims that items were for

⁷⁹Timmerman, p. 248. The Scuds were apparently shipped in 1987.

⁸⁰ Providing exact numbers of organizations involved in exports to Iraq is a process fraught with pitfalls. Front companies, subsidiaries, and reporting errors introduce uncertainty. The numbers of organizations involved reflect those identified in press accounts; therefore this is probably not a complete list; also they do not reflect companies confirmed as having been involved in selling missile technology to Iraq. The main value of this table and the two which follow is in illustrating the overall scale and complexity of the Iraqi missile procurement effort.

The main sources for this table are two compilations of suppliers of unconventional weapons technology: "Iraq's Suppliers of Unconventional Weapons Technology," prepared by Middle East Defense News (MEDNEWS, copyright 1990-91; information current as of March 2, 1991); and "Missile Exports to Iraq," from a computer data base at the Monterey Institute of International Studies, 1992. Another, older listing is "Alleged Sensitive Nuclear, Missile, and Chemical Weapons Exports Involving West German Firms and Nationals," by Leonard S. Spector of the Carnegie Endowment for International Peace, May 11, 1989. The numbers of companies include any linked to SSM programs, including the Scud upgrades, the Condor/Badr 2000, and the Saad 16 missile R&D complex.

⁸¹"Iraqi Missile Program Involvement Detailed," *Der Spiegel* (in German) 18 November, 1991, pp. 41-52; translated in Foreign Broadcast Information Service, Western Europe, 21 November 1991 (FBIS-WEU-91-225), pp. 11-14.

civilian use, and facilitated by front companies.⁸² For example, a producer of gyroscope parts for Scud missiles declared his products as detection equipment for use in oil drilling.⁸³ Other items such as mobile launch vehicles were sold as dual-use items.⁸⁴

Scud technology is relatively simple, and the Iraqi Scud program is aimed at indigenous production. Iraq procured the necessary machinery abroad, usually in redundant quantities. Most Scud components, aside from the guidance system and possibly the fuel, were being produced, or could have been produced, by the Iraqis. Once complete, this development would make Iraq virtually independent of foreign supplies for the Scud, and hence, free of the MTCR.

Some suppliers who are MTCR signatories did not aggressively enforce the Regime's provisions or its own export-control laws. German and other European companies contracted to build extensive missile R&D, support, and production facilities in Iraq. The United States on occasion failed to enforce the Regime's provisions.

Examples of U.S. equipment sold to Iraq to support the liquid-fueled ("Scud-type") missile program include machine tools and lasers (1988); and an advanced hybrid analog computer used for tracking missile tests and wind-tunnel experiments (1987).⁸⁵ Export of these items is proscribed under the MTCR. Nevertheless, the Department of Commerce granted export licenses. Commerce cited several reasons for its decisions: the U.S. "tilt" to Iraq during the Iran-Iraq War, during which the country was removed from the list of terrorist nations (1982); the fact that until the Iraqis invaded Kuwait, the administration did not pressure Commerce to strongly enforce export controls to Iraq; and that Commerce was not legally bound to accept DoD reservations regarding sales. However, on some occasions Commerce officials did not consult State or DoD before issuing an export license--and either misinterpreted MTCR restrictions or apparently reviewed the license applications in too sloppy a manner.⁸⁶

⁸² Ibid, pp. 12-13.

⁸³ Ibid, p. 12.

⁸⁴ Ibid, p. 14.

⁸⁵ Strengthening the Export Licensing System-- First Report, pp.21-23.

⁸⁶ Ibid, pp. 22, 25-26.

In terms of scale and complexity, the Scud-upgrade project pales in comparison with the Iraqi program to develop and produce solid-fueled ballistic missiles. The goal was the production of the two-stage Badr-2000, a copy of the Argentine-Egyptian Condor II missile, which was based on U.S. Pershing technology. This missile was a complete R&D and production effort, not just an upgrade of an existing system, and its solid propellant embodied more advanced technology than the liquid-fueled Al Hussein. With its range of 600 km the Condor II/Badr 2000 is the kind of missile the MTCR is designed to stop.

The Argentines had been working clandestinely since the late 1970s to develop a solid-fueled ballistic missile; they contracted with Messerschmitt Boelkow-Blohm (MBB) of Germany to assist them. A short-range missile or sounding rocket, the Condor I, was developed in the early 1980s. Condor I has a range of about 60 miles. In 1984 the Iraqis joined the Argentine effort, with the goal of producing a missile with much longer range than Condor I. Much initial research and development of the Badr 2000/Condor II was carried out in Argentina, with the assistance of Egypt and financing by Saudi Arabia. Of course, none of these countries are signatories to the MTCR.

The international effort to develop and procure components for the Badr 2000/Condor II was largely managed by a front organization of German origin called CONSEN (CONSolidated ENgineering), having its main office in Zug, Switzerland. CONSEN was shrouded from scrutiny by 16 subsidiaries, including the Zug-based Institute for Advanced Technology (IFAT). The financing, production, and shipment effort was complex, involving companies in at least nine countries (see table 6-2); this table is probably incomplete, and excludes developers of Badr 2000 not linked to CONSEN and also those who built the Saad 16 complex, which housed Badr-2000 R&D facilities. The suppliers listed below are a subset of the missile-technology suppliers in Table 6-1 above.

Table 6-2. Suppliers for Iraq's CONSEN Group Countries and number of companies.⁸⁷ (estimated from press reports)

Argentina	3	Jersey (UK)	1
Austria	4	Monaco	2
France	2	Switzerland	2
Germany	4	United Kingdom	2
Italy	1	United States	1

⁸⁷For sources and caveats, see footnote 79.

Technology and materials flowed from Italian firms including Snia BpD (fuels); the French firm of Sagem (guidance systems); and the Swedish concern, Saab-Scania (transporters), usually through fronts.

Iraq used Egypt as a front-country in cooperating with Argentina. The then-Egyptian Minister of Defense, Abdelhalim Abu Gazala, funneled Iraqi money into the project, which was ostensibly Argentine-Egyptian. A Condor factory was to be set up in Egypt, but Iraq sought equivalent facilities. Under Project 395 (or "DOT") the Iraqis used numerous German and Austrian companies, operating virtually free of export constraints, to set up a missile R&D center near Mosul, called Saad 16; this work began in 1984, well before the MTCR's signing. German firms including Gildemeister, MBB, and Aviatest, participated.⁸⁸ Beginning in 1987, three missile plants were constructed: at Al Fallujah, Al Hillah, and Karbala.⁸⁹

The United States made strenuous efforts to stop the Condor/Badr 2000 program. Diplomatic pressure was put on Argentina and Egypt to cancel the project.⁹⁰ U.S. Customs agents apprehended an Egyptian, Abdelkader Helmy, attempting to smuggle high technology carbon fiber from the United States. The President of Egypt, also under U.S. pressure, fired Defense Minister Gazala, who had been funding the Argentine-Egyptian effort. These developments caused Iraq to attempt to push the program to completion on its own.

In some cases, items and materials could not be obtained for the Badr 2000, due to export restrictions. One example is the U.S.-made material called Kevlar, which can be used to make rocket motor cases. The Iraqis substituted maraging steel for Kevlar.

A novel Iraqi ballistic program was the supergun. This weapon, scarcely imaginable to the MTCR's signers, sprang from the mind of freelance Canadian ballistics expert Gerald Bull. Bull had worked on Canadian, U.S., and South African projects. Bull

⁸⁸Jürgen Scheffran and Aaron Karp, "The National Implementation of the Missile Technology Control Regime--The US and German Experiences," in Brauch, et al. p. 242.

⁸⁹"Assistance to Iraqi Scud Program Described," *L'Express* (in French), February 8, 1991, pp. 10-12; translated in Joint Publications Research Service, *Arms Control* (JPRS-TAC-91-004), February 12, 1991, p. 43.

⁹⁰Cordesman, p. S5063.

promised Iraq that, given sufficient funding, he could design and build an artillery piece that could hurl a rocket-assisted warhead hundreds of miles.

Using Iraqi funds, Bull developed his own network of front companies to procure and ship to Iraq components for the supergun. Bull's company, Space Research Corporation (SRC), set up branches in Canada, Belgium, and Switzerland, to carry out the R&D work on the gun. A Barbados holding company controlled a procurement company with offices in Athens and Brussels. For propellants and explosives, SRC also worked through a Belgian firm that had a direct interest in SRC. Other components were procured through outright purchase of an existing, bankrupt UK manufacturer, by a front company, which was held by yet another front company!⁹¹ A partial list of suppliers for the supergun is given in Table 6-3 below.

Supergun components were sometimes mislabeled as civilian items. For example, orders were placed with a British company for supergun barrel segments destined for shipment to Iraq. They were claimed by both the Iraqis and the British manufacturer to be petrochemical tubing.⁹² No export license was required in Britain for such an item. Other parts made in Italy were also labeled as equipment for a petrochemical plant.

Table 6-3. Suppliers for Iraq's Supergun Countries and Number of Companies.⁹³ (estimated from press reports)

Belgium	5	Netherlands	2
Germany	8	Switzerland	2
Greece	1	United Kingdom	16
Italy	2	United States	1
Spain	3		

6.2.2 Circumvention of the Missile Technology Control Regime.

The Missile Technology Control Regime is a suppliers' regime. Therefore, Iraq, a nonsignatory and a purchaser is not, strictly speaking, a violator. To the extent that MTCR violations have occurred they have been the result of actions, or non-actions, of

⁹¹Timmerman, p. 322.

⁹²Glenn Frankel, "Britain Blocks Suspected Arms Shipment to Iraq," *The Washington Post*, April 13, 1990, p. A1.

⁹³For sources and caveats, see footnote 79.

signatory governments. However, the recipient of the missile technology, Iraq, sought to assist technology vendors in circumventing the Regime.

Did any supplier nations violate the MTCR? The question is difficult to answer. There is no institutional mechanism in the MTCR to define, declare and reveal violations. Few if any public admissions have come from any of the signatories. One German official, Lutz Stavenhagen, minister of state in the Chancellor's Office, did admit that in 1986 and 1987, German companies had assisted Iraq in increasing the range of its Scuds.⁹⁴ But it is not reported that he admitted that the MTCR had been violated--and it would appear that many if not most of these particular Iraqi sales could have been made before the Regime's signature in 1987.

Assistance from signatories to construct the Badr 2000 factories and the Saad 16 R&D center, if made after 1987, could most likely qualify as MTCR violations. Criminal proceedings were initiated in 1991 against several German companies, including Gildemeister Projecta GmbH, the general contractor for Saad 16.⁹⁵ But securing convictions will be difficult. Many of the Iraqi sales were not illegal in that "they were not bound to be subject to control."⁹⁶ Even if they had been illegal and made from companies located in signatory states, some were sold on false Iraqi claims that items were destined for civilian use. Since under German export laws, unless the exporter knows the dual-use items he or she is selling are destined for military projects, he or she is not breaking any law. Consequently, front companies and subsidiaries are useful, since the false declaration exonerates the exporter.⁹⁷

⁹⁴"Assistance to Iraqi Scud Program Described," *L'Express* (in French), February 8, 1991, pp. 10-12, translated in Joint Publications Research Service, *Arms Control*, February 12, 1991, p. 42. Also, *Der Spiegel* (28 January 1991, pp. 24-27) reported a confidential German report of August 1990, which stated "that it was primarily 'medium-sized German enterprises' which, with entrepreneurial spirit and business sense, helped place Israel within the range of Iraqi warheads." "My Cousin in Baghdad," translated in Joint Publications Research Service, *Arms Control*, 12 February 1991, p. 46.

⁹⁵"Mik," "Saddam Hussein's German Business Partners: The Confidential Preliminary Report of Investigations on Suspicion of Illegal Arms Exports," *Die Welt*, February 11, 1991, p. 6, translated in Joint Publications Research Service, *Arms Control* (JPRS-TAC-91-006), March 15, 1991, p. 44.

⁹⁶Scheffran and Karp, p. 244.

⁹⁷Stephan-Andreas Casdorff, "Suitable for Killing, Unsuitable for an Indictment," *Sueddeutsche Zeitung* (in German), February 2, 1991, p. 10, translated in Joint Publications Research Service, *Arms Control* (JPRS-TAC-91-005), February 28, 1991, p. 43.

In November 1991, MTCR members agreed to expand the guidelines and annexes of the Regime, and to include some technologies which were hitherto left off the annexes. Performance parameters for components falling under Category II had new or tightened limits almost across the board. A meeting of the Regime's members is scheduled for June 1992, at which the guidelines may be further expanded; range and payload of missiles and subsystems allowed under Category I will be reduced to limit ballistic capabilities to deliver all weapons of mass destruction, including the lighter CW and BW warheads.

6.2.3 Conclusion.

Under the Missile Technology Control Regime, Iraq was able to proceed with its missile programs, albeit more slowly than if the regime had not been in place. The current informal nature of the regime, its lack of central monitoring and enforcement provisions, and especially the large number of nonsignatories, indicate that, without radical improvements, a determined missile proliferator stands a good chance of deploying missiles with ranges of over 300 kilometers. The MTCR should thus be part of a comprehensive policy of addressing both the supply and demand side of the missile-proliferation problem. Supply-side policies such as export restrictions can slow proliferation, but not stop it. Active diplomatic efforts and provision of defensive military capabilities may be equally important in reducing the perceived needs of nations to develop or acquire their own ballistic missiles.

6.3 CHEMICAL EXPORT CONTROLS: THE AUSTRALIA GROUP.

The Australia Group is the principal multilateral mechanism for attempting to stem chemical weapons (CW) proliferation. Its establishment was due to Western concern over Iraqi use of chemical weapons in its war against Iran. While the 1925 Geneva Protocol bans the use of CW in war, it does not prohibit the "development, production, possession, acquisition, or transfer of such weapons." In 1984, fifteen Western supplier nations began meeting at the Australian Embassy in Paris to discuss ways to block the spread of dual-use chemical-related items to potential proliferant countries. The Australia Group, as constituted in 1985, agreed to a "core list" of five commonly used chemical weapons precursors and a "warning list" of 35 chemical compounds prevalent in industrial processes, but still applicable to CW diversion. Member-states were obliged to put "core-list" chemicals under national controls, but were free to decide which "warning list" chemicals would be subject to export restrictions. As is the case of the NSG and MTCR, the Australia Group is an informal regime without any administrative apparatus

or legal authority, so that enforcement procedures underpinning the regime remain each member-state's prerogative.

The twice yearly meetings of the Australia Group provide a forum for sharing intelligence data, expressing concerns about particular member-states' adherence to controls, and discussing proposals for expanding lists. Membership has increased from the initial fifteen nations to the present twenty-two.⁹⁸ In December 1990, the "core list" was extended to 14 chemicals, and, at the May 1991 meeting, the member-states approved a U.S. plan to expand the "warning list" to 50 compounds. This expansion was part of the Bush Administration's Enhanced Proliferation Control Initiative of December 1990.⁹⁹ The decision by the Australia Group to endorse the U.S. guidelines can be attributed to international concerns emanating from UNSCOM revelations of the Iraqi chemical arsenal.

6.3.1 Iraqi Acquisition of CW Capabilities.

In assessing the Australia Group, it is worthwhile to examine how Iraq obtained the hardware and know-how for its vast chemical weapons capability. By the 1970s, Iraq was engaged in a deliberate, long-term effort to acquire the know-how to develop its own chemical program.¹⁰⁰ The Iraqis contracted with multiple foreign suppliers of CW-related items and hired foreign firms to build facilities inside Iraq in an effort to become self-sufficient in actual CW production. By August 1990, Iraq had built up an indigenous infrastructure of chemical weapons plants and equipment capable of annually producing over 1,000 tons of chemical agents.

The rationale behind the Australia Group is that trade restrictions will block or at least significantly slow CW acquisition. But the case of Iraq can be used to argue to the contrary. A great many countries were suppliers, unwittingly or not, to Iraq's CW program. These include not only companies from Australia Group countries, but also

⁹⁸Original members are Australia, Belgium, Canada, Denmark, France, Germany, Greece, Ireland, Italy, Japan, Luxembourg, Netherlands, New Zealand, United Kingdom, and United States. Subsequent additions include Austria, Finland, Ireland, Norway, Portugal, Sweden, and Switzerland.

⁹⁹See White House Office of the Press Secretary, "Fact Sheet on Enhanced Proliferation Control Initiative," December 13, 1990. See also Stuart Auerbach, "19 Nations Back U.S. Plan for Chemical Arms Curbs," *Washington Post*, May 31, 1991, p. 1.

¹⁰⁰See "Iraq's 13-Year Search for Deadly Chemicals", *The Washington Post*, November 3, 1984.

"emerging" suppliers like India, China, and Egypt. The Iraqis successfully exploited a multi-faceted global chemical industry and a porous export control system. A UN report described Iraq's "pattern of broad and successful procurement efforts in many countries" through both legitimate and illegitimate means.¹⁰¹

Because of the dual-use nature of the purchases, Iraq engaged in many legal commercial purchases of precursor chemicals and chemical equipment that it then applied to weapons programs. Iraq's large petroleum industry and agricultural interests served as ready pretexts for importing CW-related chemicals and equipment for its "petroleum processing," "fertilizer production," and "pesticide" industries.

The increasingly interlinked, global nature of international business and finance also played into Iraq's hands.¹⁰² Baghdad was able to move funds freely for arms-related purchases from foreign-based banks, and bought shares of or purchased outright foreign supplier companies. Two London-based, Iraqi-owned companies, Technology Development Group and Meed International, reportedly spent billions of dollars buying up foreign supplies or supplier companies for military diversion.¹⁰³ The Atlanta branch of the Italian bank *Banca Nazionale del Lavoro* was a conduit for billions of dollars of Iraqi purchases of military and industrial goods.¹⁰⁴

Iraq exploited in particular the then-lax export control policy of West Germany. The Karl Kolb company, after successfully suing the German government in 1984 over its attempts to block alleged CW exports to Iraq, constructed the Muthanna CW research, production, and storage complex, also known as the "State Enterprise for Pesticide Production." The Fallujah production plants for sarin and tabun were built through the W.E.T. GmbH, a "shell company" for Preussag AG.¹⁰⁵ German prosecutors have initiated criminal proceedings against at least 25 companies over arms-related transactions with Iraq.

¹⁰¹UN Doc. S/23165, October 25, 1991, p 10.

¹⁰²National Academy of Sciences, Finding Common Ground: U.S. Export Controls in a Changed Global Environment. (Washington, D.C: National Academy Press, 1991) p 40.

¹⁰³Frederick Kempe, "Germans Had Big Role in Helping Iraq Arm, Internal Report Shows", Wall Street Journal, October 2, 1990, p 1.

¹⁰⁴George Lardner, Jr., "Gonzalez' Iraq Expose", The Washington Post, March 22, 1992, p A1.

¹⁰⁵Details were reported in the German magazine, Stern, January 10, 1987.

Aside from Germany, many other Australia Group members supplied CW-related items to Iraq.¹⁰⁶ Italian, French, Dutch, and Spanish companies sold Iraq chemical precursors. French companies reportedly formed part of a "blind pool" to ship CW equipment without knowledge of final destination.¹⁰⁷ Even the U.S. and U.K., with relatively strong export administrations, sent Iraq legal and illicit supplies after 1984. In the U.S., the firm Sitico was an Iraqi front company for purchases of CW precursors and weapons technology. Additionally, Alcolac illegally shipped more than 500 tons of thiodiglycol to Iraq. More than 17,000 kilograms of sodium sulphide were exported to Iraq from the U.K. in 1989, despite the fact that the chemical was on the British "warning list."¹⁰⁸

Developing countries were also among those supplying Iraq with precursors. India and Egypt shipped some chemicals to Iraq, and Yugoslavia supplied know-how and construction assistance for a sarin production plant.

By forcing purchasers away from established suppliers, the Australia Group may actually encourage development of alternative or indigenous supply sources for chemical weapons. As the head of Iraq's strategic weapons development, Amer Hammoudi al Saadi, observed: "I am personally grateful to many of the 'No's' we received from our arms suppliers...When we wanted things that we could not obtain from the outside...we made them ourselves."¹⁰⁹ However, controls did prevent Iraq from obtaining some compounds that are particularly difficult to make. For example, Iraq did not have an even more effective GB/GD mix because it could not obtain or make the GD alcohol.

Iraq's wide-ranging acquisitions underscore the difficulty of controlling CW technology. The vast majority of chemicals and chemical-processing equipment are dual- or multi-use. Iraqi chemical equipment purchases were usually portrayed as intended for legitimate industrial applications such as pharmaceuticals, fertilizer, pollution control

¹⁰⁶See Webster, William, then-CIA director, testimony before Senate Committee on Governmental Affairs, "Global Spread of Chemical and Biological Weapons", February 9, 10, 1989, p 12-13.

¹⁰⁷Youssef M. Ibrahim, "French Reportedly Sent Iraq Chemical War Tools", The New York Times, September 20, 1990.

¹⁰⁸Ralph Atkins and Clive Cookson, "Chemicals on official warning list exported to Iraq," Financial Times, November 22, 1991, p. 8.

¹⁰⁹Quoted in Mednews, May 8, 1989, 2, 2/3. See also Matthew S. Meselson, statement before the Senate Foreign Relations Committee, May 9, 1989, pp. 128-129.

equipment, pesticides, and plastics. It is impossible for export control officials or companies to determine actual end use intended for a specific chemical-related export. In fact, several foreign companies accused of supplying war-related items to Iraq had legal charges dropped because the goods exported were not subject to export licensing.¹¹⁰ Any attempt to place such items on a controls list would be impractical and futile. In the United States, companies involved in the \$39 billion annual chemical export trade view controls on chemical precursors and chemical production equipment as self-defeating and fear a competitive advantage for rival foreign firms.¹¹¹

Furthermore, the policies of many governments toward Iraq in the 1980s shows how the targets of non-proliferation efforts can change over time. Iraq's acquisition efforts exploited the fear among Western nations of the threat posed by Iran, Iraq's foe during the Iran-Iraq war. Many governments considered Iraq the lesser of two evils and thus were willing to de-emphasize to some extent their concern over Iraq's arms acquisitions, or Iraq's use of CW against Iran and its indigenous populations. During a period when Western and East European governments were selling Iraq billions of dollars of conventional weapons,¹¹² it is perhaps unsurprising that trade in unconventional items like CW went on uninterrupted. Uncertainty over which countries should form the target of CW controls further impedes the effectiveness of the CW non-proliferation regime.

Any CW export control regime will also encounter difficulty in determining which substances constitute CW. During the U.N. inspections, Iraqi officials asserted that thousands of CW shells containing non-lethal tear gas and classified by the U.N. as munitions should not be considered weapons,¹¹³ despite having been used for military purposes in the war against Iran.

Many chemicals usable in or as weapons cannot and will not be subject to export controls. Under the Australia Group, controls are aimed at the 50 most common CW precursors. Principally, these are compounds used in the U.S. processes for making

¹¹⁰Mathias Plugge, "The Iraqi Connection", International Defense Review, June, 1991, p 569-70.

¹¹¹Eric Arzubi, "Australia Group Countries Contemplate Chemical Controls", Export Control News, June 28, 1991, p 16.

¹¹²From 1979-1989, Iraq bought \$159 billion in arms (measured in constant 1989 dollars). U.S. Arms Control and Disarmament Agency, World Military Expenditures and Arms Transfers 1990 (Washington, D.C.: GPO, 1991) p 109.

¹¹³UN Doc. S/23472, p 23.

specific CW agents. There are several other viable processes which may use different compounds.

Export controls are also undermined by the difficulty of tracing supplies of CW-related goods, in particular chemical precursors. As an expert on CW has noted, "A single train load of chemicals can change hands six times on the way from the factory to the port."¹¹⁴ In addition, the small size and easy dispersibility of CW storage containers makes CW a relatively easy armament to transfer or hide.¹¹⁵ These realities make it very hard to keep a proper accounting of possible diversion of chemicals at "civilian" production plants. The tracing problem is especially pronounced when the destination country is careful, as was Iraq, to cover its tracks. To hide the final destination, Iraq often shipped CW items from point of purchase to a second or even third country before arrival in Iraq. During the U.N. inspections, the Iraqis made deceptive or contradictory statements about identifying markers on CW containers.¹¹⁶ Furthermore, installations that were known to be military in nature had been stripped of their military trappings and personnel, complicating the task of inspectors attempting to construct a complete inventory of Iraqi CW.

It is evident that acquisition of a CW capability requires a relatively basic level of expertise.¹¹⁷ The expertise and knowledge that Iraq acquired through its foreign dealings cannot be erased by the UN mandate, or blocked by continuing strict imposition of export controls. The growing world level of CW expertise will enable Iraq or other countries to develop these weapons, no matter how tight the export control regime. According to CIA Director Robert M. Gates:

If U.N. sanctions were relaxed, we believe Iraq could produce modest quantities of chemical agents almost immediately, but it would take a year or more to recover the CW capability it previously enjoyed.¹¹⁸

¹¹⁴Julian Perry-Robinson, as quoted in Mednews, October 24, 1988, 2, 2/3.

¹¹⁵Containers of CW can be stowed literally almost anywhere. U.S. satellites documented Iraqi burial of CW containers in graveyards.

¹¹⁶UN Doc. S/23165, October 25, 1991.

¹¹⁷Kathleen C. Bailey, statement before Joint Economic Committee, March 13, 1992, p 5.

¹¹⁸Robert M. Gates, statement before the Senate Committee on Governmental Affairs, January 15, 1992, p. 7.

6.3.2 Conclusion.

The Iraqi experience shows that a country determined to acquire CW capability will almost inevitably succeed. The ultimate lesson may be that a reliance on legal prohibitions or trade controls as the mainstay of a CW policy will most likely fail. While export controls attempt to stem the "supply" of CW technology, diplomacy should be used to address the "demand" for CW arising from regional fears and conflicts. Other ways to address the CW problem include defensive measures, preemptive military action, or tough international sanctions against countries that actually use chemical weapons. Countries employing sanctions might cite the 1925 Geneva Protocol,¹¹⁹ which prohibits the "use in war" of CW, as a legal justification for imposition. The Protocol could be expanded to cover use of CW against indigenous populations, such as Iraq's use of CW in 1983-84 against the Kurds. Because of the same global, open nature of the world trading system that inhibits CW export controls, however, such sanctions would have to be fully international in character in order to be really effective.

6.4 BIOLOGICAL WEAPONS AND EXPORT CONTROLS.

The 1972 international ban on BW is formally entitled the Convention of the Prohibition of the Development, Production, and Stockpiling of Bacteriological (Biological) and Toxin Weapons and on Their Destruction. This ban has no verification provisions, and it is the position of the United States Government that there are no technical means which can be used to effectively verify such a ban. One of the central reasons for this is the fact that the equipment, know-how, and techniques for BW production are essentially the same as those used in legitimate medical research. This is the same reason that no export control regime directly deals with equipment and components related to biological weapons, although the Australia Group is considering expanding its activities to incorporate BW.

There are many unanswered questions about Iraq's BW program, including: Did it manufacture and stockpile BW? Are there undiscovered BW production facilities? Are there trained personnel, equipment, and facilities ready to restart BW production once UN inspectors leave Iraq? How much of the program has relied on imported equipment, materials, and technology? Without a defector (or an informant from a foreign country

¹¹⁹Protocol for the Prohibition of the Use in War of Asphyxiating, Poisonous or Other Gases, and of Bacteriological Methods of Warfare. June 17, 1925.

who has participated in or supplied the Iraqi program) to provide information (as there was for the nuclear program) there is little hope of answering these questions.

Indigenous, clandestine BW programs are very unlikely to be discovered with national technical means of intelligence-gathering. BW programs can be small, easily hidden, are relatively low-cost, and can use dual-use equipment. BW can be manufactured using the "low-technology route," requiring no imports--even in the case of countries with inferior technical infrastructures.

6.4.1 Iraqi Imports.

Perhaps in order to attract materials, expertise, and technologies related to the development of biological warfare agents, Iraq recently established a new Genetic Engineering and Biotechnology Research Center. By emphasizing its interest in the development of vaccines and other peaceful biological research, over the years Iraq probably hoped to plug into an existing network to advance its biological weapons research. Iraq, for example, was the first nation to ratify a UN agreement setting up international centers for biological research in Trieste, Italy and New Delhi, India. A further example of this networking activity was the establishment of a joint Iraqi-Jordanian-Saudi government-owned firm called the Arab Company for Antibiotic Industries. This factory reportedly is capable of producing 200 tons of penicillin per year.¹²⁰

A number of biological facilities in Iraq were built with foreign assistance. Iraq also acquired biomedical equipment by using external sources. These contacts had the effect of accelerating Baghdad's BW research and development program.

Plants at Samarra were built with Soviet assistance. Samarra is one of Iraq's chemical weapons research sites, but it also is possible that Iraq had biological research facilities at the complex. The Iraqi State Enterprise for Drug Industries, a pharmaceutical enterprise, is run out of Samarra.¹²¹

¹²⁰Anthony H. Cordesman, "No End of a Lesson? Iraq and the Issue of Arms Transfers," *RUSI Journal*, Spring 1991, p. 5.

¹²¹Anthony H. Cordesman, "No End of a Lesson? Iraq and the Issue of Arms Transfers," *RUSI Journal*, Spring 1991, p. 5.

France also contributed to the expansion of Iraq's biological expertise. Most notably, France designed a factory in Doura, Baghdad for manufacturing vaccine for foot-and-mouth disease.¹²² The plant employed French technicians and shipped its product to France. Reportedly, Izzat al-Douri, who served on the Iraqi ruling Revolutionary Command Council as minister of agriculture, signed a contract with the Institute Merieux on November 2, 1974 to have this Paris-based firm set up Iraq's first laboratory for foot-and-mouth disease. Through Iraq's General Directorate of Veterinary Services, Iraqi officials purchased the necessary materials needed to produce vaccines.¹²³

Iraq received additional support for its biological research and vaccine development program from a number of German companies. Indications that West German companies were engaging in business with Iraq to assist it with research on biological weapons began to surface as early as 1988. There was a three year period in which BW-related equipment may have been imported for which there is no record. Among other unnamed companies from other countries, roughly 24 West German firms may have assisted Iraq by constructing production sites for biological and chemical weapons.

In April 1988, the FRG sentenced a German citizen for delivering a small quantity of cancer-causing micotoxins (100 milligrams each of T-2 and HT-2--which are derived from trichothecia and lethal in small amounts¹²⁴) to Iraq in 1986. Reportedly, Josef Kuehn of the West German firm Plato-Kuehn, a subsidiary of the U.S. firm Sigma Chemi, was involved with this transfer. These are the same toxins reportedly used by the Soviet Union in Afghanistan and by Vietnam in Cambodia.¹²⁵

In October 1991, the German Federal Economics Ministry disclosed the fact that a Hamburg-based firm, WET (Water Engineering Trading), "supplied microbiological parts

¹²²Cordesman, "No End of a Lesson? Iraq and the Issue of Arms Transfers," p. 5.

¹²³Kenneth R. Timmerman, The Death Lobby. How the West Armed Iraq (Boston: Houghton Mifflin, 1991), p. 20.

¹²⁴These mycotoxins are toxic at the level of about 1 mg per kg of body weight, which is much less toxic than nerve agents.

¹²⁵Hamburg DPA in German, 1819 GMT, January 19, 1989, transcribed in FBIS-WEU-89-013, January 23, 1989, p. 11; "We Have Surprises," Der Spiegel in German, October 8, 1990, pp. 148-152, translated in FBIS-WEU-90-196, October 10, 1990, p. 10; Cordesman, "No End of a Lesson? Iraq and the Issue of Arms Transfers," p. 5.

and fluid culture media" to Iraq.¹²⁶ One report said that "far more than 100 assorted items of serums, heating equipment, and drying closets," including 48 fermenters, were exported to Baghdad. The order was placed by military officials who worked for the State Establishment for Pesticides Production. Baghdad claimed that this equipment was not for the purpose of producing chemical or biological weapons. Rather, it was to be used for "examinations in the area of clinical hospitals."¹²⁷

WET reportedly obtained incubators and culture media from an unsuspecting third party, Oxoid GmbH (now Unipath GmbH) of Wesel, Germany. Oxoid/Unipath operates a wholesale trade business for bacteriological culture media. WET is known to have assisted Iraq also with its chemical weapons program. These parts and material, all of which were suitable for the production of biological weapons, were sent to a chemical weapons plant located near Samarra. Other firms, including the Hannover-based Preussag, the Ibbenbüren-based firm Schwender, and Labconsult (LABSCO GmbH) of Dreieich, have shipped equipment to Iraq used to produce bombs and artillery that could be employed to deliver biological or chemical munitions.¹²⁸

A number of other German and Austrian companies have assisted Iraq over the years in this field. Salman Pak was a research and development facility that was built between 1981 and 1983 for Iraq by Thyssen Rheinstahl Technik, a German company. Thyssen employed a number of unnamed subcontractors for this \$9 million project.¹²⁹ V-Consult Ingenieur, a West German firm, is said to have contributed to the construction of a biological production facility. The Karl Kolb company, responsible for supporting Iraq's CW research and development efforts, was reported to have supplied Iraq with mobile toxicology laboratories, which were supposed to be used for agricultural chemistry. The companies of Rhein-Bayern Vehicle Construction, Anton Eyerle, and Iveco Magrius

¹²⁶"Iraq Documents: Supplies For Biological Weapons," *Hamburg Bild* in German, October 24, 1991, p. 8, translated in FBIS-WEU-91-207, October 25, 1991, p. 1.

¹²⁷"We Have Surprises," *Der Spiegel* in German, October 8, 1990, pp. 148-152, translated in FBIS-WEU-90-196, October 10, 1990, p. 9.

¹²⁸"We Have Surprises," *Der Spiegel* in German, October 8, 1990, pp. 148-152, translated in FBIS-WEU-90-196, October 10, 1990, p. 9; see also "Iraq Documents: Supplies for Biological Weapons," *Hamburg Bild* in German, October 24, 1991, p. 8, translated in JPRS-TND-91-018, November 18, 1991, p. 40.

¹²⁹Carus, "The Poor Man's Atomic Bomb"?, p. 9.

Deutz also were said to have transferred similar mobile laboratories to Baghdad.¹³⁰ The Austrian firm of Swatek and Cerny delivered sanitary equipment that could have been used in a biological weapons program.

The United States may have contributed to Iraq's BW development program by possibly shipping strains of the tularemia bacterium to Baghdad. The American Type Culture Collection is believed to have sent to Al-Ameriya, Iraq "attenuated strains of various toxins and bacteria." A unique strain of West Nile Fever may have been sent to Baghdad by the U.S. Public Health Service, Center for Disease Control. These strains ostensibly were sent to Baghdad for the purpose of medical research. Sigma Chemie, a U.S. company, also was believed to have transferred viruses to Iraq that could be used for the production of biological weapons.¹³¹

6.5 CONCLUSION.

Iraq was inhibited by export controls, particularly in the nuclear area. Had nuclear export controls not been in place, it is fairly certain that Iraq would have been a nuclear-weapons state some years ago. Despite the inhibitions, Iraq was well on its way to acquiring nuclear explosives via a two pronged effort to develop simpler nuclear technologies indigenously and to circumvent export controls for more difficult items.

In the missile area, Iraq was also inhibited. While Iraq was unable to import sophisticated missiles, it had a successful program to manufacture inaccurate, intermediate-range ballistic missiles. It was also working on remotely piloted vehicles that could have served as crude cruise missiles, and a supergun. To support these efforts, Iraq developed circumvention techniques to get around export controls and was enhancing its indigenous capabilities--a parallel approach like that undertaken in the nuclear area.

In chemical weapons, Iraq was virtually self-sufficient. Even though it had imported plants, equipment, and precursors which were dual-use, it would have been able to manufacture CW on its own. The removal of export controls, however, would have

¹³⁰Cordesman, "No End of a Lesson? Iraq and the Issue of Arms Transfers," p. 5.

¹³¹Ottaway, "U.S. Gives Iraq Bacteria," p. 16; Carus, "The Poor Man's Atomic Bomb?" p. 13; Cordesman, "No End of a Lesson? Iraq and the Issue of Arms Transfers," p. 5; Interview with Martha Girdany, U.S. BW Inspector with UNSCOM 15, on February 25, 1992.

allowed Iraq to achieve more efficient production and higher purity agents. Similarly, Iraq's development of biological weapons need not have been dependent on imports if it had decided to pursue production with "low-technology" means using indigenous organisms. There is evidence, however, that Iraq did choose to exploit foreign suppliers not only for equipment and materials, but also for technical information.

SECTION 7

IRAQ'S DISINFORMATION AND PROPAGANDA CAMPAIGN

As part of its circumvention strategy to neutralize the UN resolutions, the Iraqi regime has initiated a disinformation and propaganda campaign to convince its own population and Third World (especially Arab) states that the UN actions are motivated by a U.S. "neo-colonialist" plot, abetted by "Zionist" allies. The real motive behind this campaign is to maintain Saddam Hussein in power and preserve as much of his weapons inventory and infrastructure as possible. Iraq's international success in this respect has thus far been limited: in March, 1992, Third World members of the Security Council called for full Iraqi compliance with the UN resolutions. The internal propaganda campaign may have had some success in consolidating support for the regime among the Ba'ath Party elite.

7.1 PROPAGANDA THEMES.

In this report, Iraqi disinformation and propaganda are assessed through analysis of four propaganda themes advanced by Iraq:

- "legalistic" arguments, stressing alleged Iraqi compliance with international law;
- "humanitarian" arguments, portraying the purported suffering of innocent Iraqi civilians, due to the trade embargo;
- "intelligence" arguments, charging that the inspection regime is basically a cover for CIA activities (in close collaboration with Mossad); and
- "pan-Arab" arguments, calling on fraternal solidarity to resist Western "neo-colonialism."

These propaganda themes are examined in their application to Iraqi resistance to demands of the UN and International Atomic Energy Agency (IAEA) inspections, the U.S. role in enforcing the United Nations resolutions, and the imposition of trade sanctions to compel compliance with these resolutions.

7.1.1 "Legalistic" Arguments.

The Iraqis consistently claim that they are even more rigorous "true believers" in the tenets of the United Nations Charter than the UN Secretariat, the Security Council, or the U.S. government. In a series of communications to the Security Council, Iraqi representatives have insisted that they have abided scrupulously by provisions of Resolution 687 (requiring destruction of NBC weapons, and ballistic missiles with ranges

greater than 150 kilometers, as well as their components and R&D facilities) and cooperated fully with the inspections. It was the UN/IAEA sixth team, led by David Kay, a "CIA operative," which "broke into" the Iraqi Atomic Energy Commission administration building and "stole" documentation, allegedly consisting primarily of personnel records. Kay and the other inspectors also were supposedly not following approved document logging procedures at the time of the initial confrontation. The Iraqi Foreign Ministry even submitted a "factual" report of its own, detailing the level of cooperation with UN/IAEA inspections and pointing out alleged misinterpretations and fabrications in the official UN/IAEA reports.¹³²

On the weapons destruction issue, Iraqi spokesmen, most notably Deputy Prime Minister Tariq Aziz, have charged that the sweeping UN plan poses an unprecedented infringement on the principle of Iraqi national sovereignty.¹³³ Nevertheless, Aziz appeared willing to accept a "narrow" legal interpretation of these UN resolutions, whereby all declared weapons and equipment designed for weapons development would be eliminated.

The question of dual-use equipment provided Aziz with further grounds for legalistic arguments. According to his view, all dual-use items should be transferred to civilian industry. In his Security Council speech, Aziz emphasized the dual-use dilemma:

How are we to understand, for example, the determination to destroy an entire computer unit for the sole reason that this computer unit was used to calculate the performance of a rocket engine? Why is it not deemed sufficient to erase the diskette program or to destroy the diskette itself?¹³⁴

Iraq, in his perspective, sought a "reasonable" compromise through an "expert-level dialog" between Special Commission representatives and Iraqi experts. This "dialog" would be directed toward ironing out differences and stipulating what precisely should be destroyed. However, such a precise inventory list would give the Iraqis another forum for making the case to preserve dual-use items. At the same time, some Iraqi spokesmen continued to take a hard line, thereby providing diplomatic leverage to "soft-liners" like

¹³² See UN Doc. S/23472 (January 24, 1992), pp. 11-38.

¹³³ See text of his UN speech reported by Baghdad INA radio, March 11, 1992, and translated in FBIS-NES-92-049 (March 12, 1992) pp. 17-22.

¹³⁴ Ibid, p. 21.

Aziz. First Vice President Taha Yasin Ramadan, for example, has vehemently opposed any implementation of the UN resolutions.¹³⁵

Another Iraqi stratagem is to paint President Bush as the "aggressive" international renegade defying legal constraints to destroy Iraq. Iraqi media and spokesmen regularly reject "flagrant" U.S. interference in Iraq's internal affairs. Foreign Minister Ahmad Hussein has castigated Bush's repeated calls for the overthrow of Saddam as a direct contradiction of "the letter and spirit" of the UN Charter, which opposes the use of force against the territorial integrity or political independence of any state.¹³⁶ These appeals to the UN Charter come from a regime that violated the territory and independence of Kuwait. On another occasion, the Foreign Minister charged that the U.S. and its allies, in imposing the trade embargo, violated the Fourth Geneva Convention prohibiting the blocking of food and medicine from reaching civilians.¹³⁷ The vilification of President Bush and the United States attempts to portray Iraq as the victim of Western imperialism. The propaganda campaign also aims at shifting global media attention toward rebutting Iraqi charges and away from investigating Iraqi transgressions.

7.1.2 "Humanitarian" Arguments.

Iraq portrays the UN embargo as having a devastating effect on its women, children, and elderly. The state-controlled newspaper al-Qadisiyah charged the Security Council and the United States with "genocide" against the people of Iraq:

The paper calls on the world community to lift the blockade against the Iraqi people so that they can ward off the danger threatening children, women, elderly, and the sick. It stresses that the United States and its allies are involved in a deceitful and exposed maneuver in the UN corridors to buy time to serve their malicious political objectives at the expense of the lives of tens of thousands of Iraqi children, and a similar number of sick and old men and women.¹³⁸

¹³⁵ Account of interview by Therese Haddad in Amman Sawt al-Sha'b, March 4, 1992, pp. 1,5, translated in FBIS-NES-92-043 (March 4, 1992) pp. 21-22.

¹³⁶ Baghdad INA radio report, October 12, 1991, translated in FBIS-NES-91-199 (October 15, 1991) p. 16.

¹³⁷ Baghdad INA radio report, September 28, 1991, translated in FBIS-NES-91-189 (September 30, 1991) p. 22.

¹³⁸ Summary of article on Baghdad INA radio, August 1, 1991, translated in FBIS-NES-91-148 (August 1, 1991) p. 17.

No mention was made in the Iraqi media of Kurdish and Shi'ite deaths owing to Saddam's brutal repression. However, the Iraqi Trade Minister did remark that U.S. food supplies distributed to the Kurds were "unfit for human consumption."

The Iraqis also played fast and loose with mortality statistics. One July report stated that 6,000 children had died because of the embargo. However, it also cited a visiting Harvard University team's estimate that 170,000 Iraqi children could die by the end of 1991. By December, the figure of 170,000 was publicly recognized as the number of fatalities among children due to malnutrition.¹³⁹ In addition, some 200,000 Iraqis were reported to have died because of lack of medicine and medical equipment. On the other hand, the UNSCOM 15 biological weapons team inspecting a pharmaceutical plant found massive stockpiles of medicine that had not been distributed to the public. These stockpiles could either have been reserved for military use or deliberately withheld from the needy in order to aggravate the situation and win Iraq international sympathy.

UN relief workers have been systematically harassed and denied access to needy populations in Iraq. Furthermore, the Iraqi government has refused to implement UNSC Resolutions 706 and 712, whereby Iraq would be permitted to sell a limited amount of oil to finance international relief efforts.¹⁴⁰ The UN had stipulated that distribution of such supplies be placed under strict international supervision to prohibit diversion to the military. Such a provision was unacceptable to the Saddam Hussein regime, which preferred to exploit its own population in order to gain international sympathy.

Food and medicine have been specifically excluded from UN trade sanctions. One State Department official commented:

Many, led by Iraqi Government officials, have overstated the impact of sanctions on the Iraqi economy. UN officials have assured us that there are adequate stocks of food in Iraq and that massive malnutrition is not a serious problem in any region.¹⁴¹

¹³⁹ Baghdad INA radio, December 21, 1991, translated in FBIS-NES-91-246 (December 23, 1991) p. 21. The earlier figures were also cited on Baghdad INA radio, July 23, 1991, translated by FBIS-NES-91-142 (July 24, 1991) p. 18.

¹⁴⁰ See U.S. State Department Report to Congress, Country Reports on Human Rights Practices for 1991 (Washington, D.C.: GPO, February 1992) p. 1423; see also Trevor Rowe, "U.N. to Weigh Use of Iraq's Frozen Assets," Washington Post, April 23, 1992, p. A38.

¹⁴¹ Deputy Assistant Secretary of State Melinda L. Kimble, statement before the House Select Committee on Hunger, reprinted in U.S. State Department Dispatch, March 23, 1992, p. 223.

Imports of food are entering Iraq at the rate estimated at about 75 percent of the prewar level.¹⁴²

Iraqi propaganda sources made the most of foreign sympathizers who reported the "plight" of its people. A visiting UNICEF delegation was told of acute shortages of medicines, medical equipment, anesthetics, and vaccines and of the spread of typhoid, polio, and malnutrition among children. An International Red Cross mission was taken to Iraqi hospitals and briefed on the lack of medicines (especially antibiotics), surgical supplies, diagnostic equipment, personnel, and food.¹⁴³ While some of these shortages are plausible, the propaganda advantage that Iraq extracts from them is inexcusable. Sympathetic American visitors are given the "red carpet" treatment. Former Attorney General Ramsey Clark, who reportedly heads a U.S. "war crimes" investigation commission, attended a Baghdad meeting of the Arab Jurists Union and was granted an audience with Tariq Aziz. According to Iraqi radio:

[Clark]...said all voices must be raised to end the blockade and the brutal aggression it represents, and to stop the war crimes perpetrated by the United States against Iraq. These crimes are represented by the killing of innocent people through the shelling of civilians and sabotaging economic, social, and industrial structures.¹⁴⁴

The Health Minister, Dr. Abd-al Salam Muhammad Sa'id, claimed that Iraq's enemies had forced truckloads of medicines to turn back at its borders because "medicines can be used for military purposes."¹⁴⁵ In similar terms during his UN speech, Tariq Aziz criticized chemical-related prohibitions:

These Iraqi people are prevented from importing chlorine to purify drinking water. The factory that produces chlorine is targeted for destruction. Iraq is also prevented from importing pesticides to combat diseases which destroy a big part of its food, on the pretext that they are chemicals which could be used in weapons manufacturing. It is also

¹⁴² Ibid, p. 223.

¹⁴³ Baghdad INA radio, February 10, 1992, translated in FBIS- NES-92-031 (February 14, 1992) pp. 34-35.

¹⁴⁴ Baghdad INA radio, February 17, 1992, translated in FBIS-NES-92-034 (February 20, 1992) p. 29

¹⁴⁵ Baghdad INA radio, August 5, 1991, translated in FBIS-NES-91-151 (August 6, 1991) p. 34.

prevented from manufacturing them. In fact, the sanctions committee has prevented Iraq from importing soap and detergents.¹⁴⁶

In this way, UN safeguards on dual-use of chemicals serve as Iraqi rhetorical ammunition for criticizing the apparent contradictions of the embargo. It should be emphasized that UNSCOM is not targeting the chlorine plant for destruction and indeed approved the Iraqi conversion plan within a 24-hour "turn-around" time. Here Aziz was playing fast and loose with the facts.

Another focus of Iraqi propaganda is on alleged American war atrocities. When news of Iraqi soldiers buried alive by US. earth-moving equipment appeared in Western media, the Iraqi media stated that this incident was "unprecedented in the history of wars and constitutes an inhumane act contradicting the known military values during wars."¹⁴⁷

The use of depleted uranium in anti-tank shells was roundly condemned as a dangerous health and environmental hazard. A series of newspaper articles from The Independent (of London) was reprinted as part of an official UN document. According to the Iraqi Foreign Ministry, exposure to radiation could cause 500,000 deaths; on the other hand, the relevant newspaper article stated:

This figure bears no relation to real hazards because for half a million to die, the uranium shells would have to be pulverized into dust and 500,000 people would have to line up in the desert and inhale equal quantities.¹⁴⁸

7.1.3 "Intelligence" Arguments.

Another constant theme of the Iraqi spokesmen and media is that the UN and IAEA inspection teams are "dominated" and "directed" by U.S. intelligence operatives. According to this view, the United States has subverted Security Council and IAEA

¹⁴⁶ Cited on Baghdad INA radio, March 11, 1992, translated in FBS-NES-92-049 (March 12, 1992) p. 22.

¹⁴⁷ Baghdad INA radio, September 16, 1991, translated in FBIS-NES-91-180 (September 17, 1991) p. 15.

¹⁴⁸ Nick Cohen, "Radioactive waste left in Gulf by allies," The Independent, November 10, 1990, reprinted in UN Doc. S/23212 (Nov. 12, 1991) p. 5. The UN was obligated to reprint this article upon request by a member-state (Iraq); such publication does not signify UN endorsement of the article. On numerous occasions, the Iraqis have exploited this UN mechanism to circulate articles deemed favorable to their position.

functions and turned the entire inspection process into an espionage or sabotage operation designed to destroy Iraqi industrial infrastructure.¹⁴⁹

The climax of the purported U.S. intelligence operation in Iraq came with the sixth IAEA inspection and the surprise raid on the Iraqi Atomic Energy Commission building. According to this Iraqi interpretation, David Kay and other alleged CIA operatives sought to claim personnel files on Iraqi scientific figures in order to turn this information over to the Israeli Mossad.¹⁵⁰ Some Iraqi sources charged that the Mossad was prepared to instigate an assassination campaign against these scientists. The villain of the piece, in Iraqi eyes, was Kay, whose "cover" position at IAEA "basically aims at besieging the Third World states and not allowing them the acquisition of nuclear technology in compliance with the directives of the U.S. CIA..."¹⁵¹ The state-controlled Iraqi newspaper, al-Thawrah, went even further:

There are tangible facts and evidence that the U.S. Administration is working to turn the IAEA into an intelligence center to gather and steal information and secrets, whether through routine inspections or ones designed for specific purposes.¹⁵²

As substantive proof of CIA infiltration of the inspection teams, Iraq offered an article from the Paris daily Libération, in which a French inspector identified team members as "apparently CIA agents." The UN duly published the charges and the article.¹⁵³ In a letter to the Security Council, Foreign Minister Hussein stated:

We also stress what we have discussed before with Mr. Rolf Ekeus that putting so many Americans on the inspection teams constitutes a major reason for stirring trouble, because those Americans execute the policy of their government, which persists in violating the letter and the spirit of the

¹⁴⁹ For example, see article by Mazhar 'Arif in Babil, August 11, 1991, p. 1, translated in FBIS-NES-91-161 (August 20, 1991) p. 20.

¹⁵⁰ Baghdad Republic of Iraq radio report, September 26, 1991, translated in FBIS-NES-91-188 (September 27, 1991) p. 25.

¹⁵¹ Baghdad INA radio, September 26, 1991, translated in FBIS-NES-91-188 (September 27, 1991) p. 26.

¹⁵² Cited on Baghdad INA radio, October 24, 1991, translated in FBIS-NES-91-207 (October 25, 1991) p. 30.

¹⁵³ See UN Doc. S/23197 (November 5, 1991) pp. 1-4.

UN Security Council resolutions and imposes its own policies that are hostile to Iraq's leadership.¹⁵⁴

Iraq also systematically protests overflights by U.S. U-2 "spy planes." One objective of this stratagem is to put pressure on the Saudis for permitting use of their air strips for these flights. The Iraqi delegate to the Arab League noted that "if this aggression is currently targeting Iraq, it will target other Arab countries in the future, with the holy lands being used as a springboard for the aggression."¹⁵⁵ Another Iraqi commentator charged that the U.S. was deliberately holding back satellite data from UN officials for "political" reasons.¹⁵⁶

7.1.4 Pan-Arab Arguments.

Nearly all of Saddam's exhortations for Pan-Arab solidarity with Iraq have foundered because of the realization that he brutally occupied one Arab state (Kuwait) and attacked another (Saudi Arabia). These actions have also cost him greatly throughout the Third World; the fact that the Saudis exercise tremendous influence in these circles has helped to preserve support for the Security Council resolutions within the Third World UN voting bloc. In March, Tariq Aziz's blatant appeal to Third World members of the Security Council fell on deaf ears.¹⁵⁷ Pan-Arab exhortations have been further undermined by Iraq's political rivalry with Syria for influence in the Arab world. Moreover, any calls for *jihad* among the Muslim states met stiff resistance from Iran.

Nevertheless, the Iraqis have continued with their "anti-Zionist" diatribes and appeals to pan-Arabism. One regular theme has been the purported linkage between the attempted "annihilation" of Iraq and the "oppression" of the Palestinian people by Israel. According to Baghdad radio:

...the despots who formulate the unjust and mean UN Security Council resolutions are the same as those who formulate capitulationist (*sic*)

¹⁵⁴ Quoted by Baghdad INA radio, September 26, 1991, translated in FBIS-NES-91-188 (September 27, 1991) p. 25.

¹⁵⁵ Statement by Ahmad 'Adil, cited by Baghdad INA radio, August 21, 1991, translated in FBIS-NES-91-163 (August 22, 1991) p. 27.

¹⁵⁶ Mazhar 'Arif article in *Babil*, p. 20.

¹⁵⁷ Paul Lewis, "Third World Lands Tell Iraq to Meet Truce Terms," *New York Times*, March 11, 1992, p. A8.

settlement plans and define steps to fulfill the wishes of the Zionists who covet Arab territory, resources, and holy places.¹⁵⁸

Another Iraqi propaganda refrain has been the inequity of the international treatment of their nuclear program, as opposed to the much more advanced Israeli program. The argument runs that Iraq needed to defend itself and its Arab brothers from the "Zionist" military menace. Iraqi Prime Minister Sa'dun Hammadi stated:

If we view the history of the region since 1948, we find that the party that has been involved in expansion, aggression, the occupation of more Arab territories, and the imposition of hegemony in the region is the Zionist entity....The whole world...knows that the Zionist entity has a huge nuclear arsenal.¹⁵⁹

However, Iraq has been relatively unsuccessful in playing the "Israeli card" in its propaganda campaign. The Arab League has refused to condemn the embargo (much to the Iraqis' discomfiture), and the Islamic summit in Dakar followed suit. According to the Iraqis:

Saudi Arabia and its followers from the agent regimes did what America asked them to do. They issued their non-Islamic resolution against Iraq, calling for the continuation of the unjust economic blockade on its militant Muslim people.¹⁶⁰

In response, Iraq has organized meetings of sympathetic Arab "front" groups like the Popular Arab Forces Conference in October, which "rubber-stamped" the Iraqi position and sought to apply political pressure on other Arab governments. The multi-national conference, attended by pro-Iraqi sympathizers, called for a boycott of U.S. goods, and resolved to "put real pressure on Arab regimes to open Arab borders with Iraq and to send medicine and food supplies to the Iraqi people."¹⁶¹ It can be assumed that Iraq is also

¹⁵⁸ Baghdad INA radio, August 26, 1991, translated in FBIS-NES-91-166 (August 27, 1991) p. 12.

¹⁵⁹ Report of speech by Baghdad INA radio, July 15, 1991, translated in FBIS-NES-91-136 (July 16, 1991) p. 23.

¹⁶⁰ Baghdad INA radio, December 11, 1991, translated in FBIS-NES-91-238 (December 11, 1991) p. 38. See also article on Arab League by Sabri Hammadi in *al-Thawrah*, November 27, 1991, p. 2, translated in FBIS-NES-91-232 (December 3, 1991) p. 17.

¹⁶¹ Baghdad INA radio report, October 13, 1991, translated in FBIS-NES-91-201 (October 17, 1991) pp. 21-28.

applying covert pressure on Arab neighbors, including support for radical opposition parties and factions within these states.

7.2 REGIONAL RESPONSES TO THE IRAQI CAMPAIGN.

The response by Iraq's Middle Eastern neighbors has been mostly negative. Only Libya and Yemen appear to have come out publicly in full support of Iraq's position. The Libyan government has called for the lifting of the embargo, although Col. Qadhafi's mercurial public statements both condemn the Iraqi invasion of Kuwait and the UN sanctions. There may even be an unofficial competition as to who rates as the West's worst enemy. One state-controlled Baghdad newspaper lamented:

When Saddam Hussein's enemies refer to Iraq's technological military development--even if the enemies have no information about chemical factories and advanced plants in Libya--al-Qadhafi leaks information about Libyan chemical factories to the media in order to incite a campaign against Libya's possession of chemical weapons in a bid to be on par with leader Saddam Hussein, and as God Almighty says: "For the scum disappears and is cast out; while that which is for the good of mankind remains on the earth..."¹⁶²

Yemeni support is slightly more predictable. While Yemen condemned the invasion of Kuwait, it also endorses the lifting of the embargo and "the dismantling of weapons of mass destruction in the entire Middle East region..."¹⁶³ In addition, the Palestine Liberation Organization enthusiastically supports Saddam's position. Other Arab governments have called for a lifting or softening of the embargo, while insisting that Iraq abide by UNSC resolutions mandating weapons destruction.¹⁶⁴ At a summit meeting in March, Egyptian President Hosni Mubarak and Syrian President Hafez al-Assad publicly opposed the use of force to compel Iraq to comply with the UN resolutions.¹⁶⁵

¹⁶² Article in Baghdad *Babil*, March 2, 1992, p. 1, translated in FBIS-NES-92-045 (March 6, 1992) p. 26.

¹⁶³ Yemeni UN representative, Abdallah al-Ashtal cited on Baghdad INA radio, June 18, 1991, translated in FBIS-NES-91-118 (June 19, 1991) p. 15.

¹⁶⁴ See report on Wakh radio in United Arab Emirates, July 25, 1991, translated in FBIS-NES-91-148 (August 1, 1991) pp. 14-15.

¹⁶⁵ Cairo MENA report, March 18, 1992, translated in FBIS-NES-92-054 (March 19, 1992) p. 6.

The Iraqi propaganda campaign has scored a few more points in the radical Arab media. However, many Arab newspapers blame Saddam directly for his people's tribulations and link his deposition with a lifting of UN sanctions. Most notably, Cairo's influential al-Ahram stated that "the Iraqi people live under a despotic regime and cannot be held responsible for the regime's sins." The article continues:

The complete embargo imposed on Iraq is unprecedented and continuing it is unacceptable, particularly because Israel is committing atrocities greater than those perpetrated by Iraq but continues to escape punishment.¹⁶⁶

In a subsequent editorial, al-Ahram called for eliminating all weapons of mass destruction in the Middle East and added with respect to the UN inspection controversies:

The superpowers and the Security Council nevertheless should stop making threats to use military force against Iraq and should desist from humiliating it in a way that threatens stability in the region and upsets the Arabs, including those who strongly opposed the Iraqi aggression against Kuwait.¹⁶⁷

The Iraqis have made informal conciliatory gestures toward Iran, but thus far to no avail. The Iranians have taken a hard line supporting the UN resolutions, charging that, "in view of the inhuman measures taken by the rulers of Baghdad against the Iraqi nation, the UN should take necessary measures to disarm the Iraqi Government as soon as possible."¹⁶⁸ Iraqi possession of weapons of mass destruction is still regarded as a direct threat against Iran, particularly since chemical weapons were used against Iranian troops during their eight-year war. Saddam's heavy-fisted repression of the Iraqi Shi'ite revolt is another factor in Iranian intransigence.

Some sympathy for Iraq has been expressed in India and Pakistan. The Indian foreign minister has reportedly called for an easing of UN sanctions for humanitarian reasons. A Pakistani newspaper editorial claimed that "[t]here is little logic in the American obsession about nuclear weapons getting into the hands of what it likes to think are 'irresponsible' countries." In this view, the U.S. upholds a double standard when dealing with Iraq and Pakistan, as opposed to Israel and India. The editorial continues:

¹⁶⁶ Quoted in Cairo MENA report, July 17, 1991, translated in FBIS-NES-91-137 (July 17, 1991) p. 8.

¹⁶⁷ Al-Ahram editorial, September 28, 1991, p. 7, translated in FBIS-NES-91-190 (October 1, 1991) p. 10.

¹⁶⁸ Tehran Voice of the Islamic Republic of Iran radio, June 28, 1991, cited in FBIS-NES-91-127 (July 2, 1991) p. 50.

The American position regarding Third World nuclear capability would not suffer if it was more consistent and less selective and discriminatory. But the way things are, it only seems that the aim behind American nuclear policy abroad is not just non-proliferation but the preservation of an iniquitous status quo.¹⁶⁹

7.3 CONCLUSION.

Saddam Hussein's disinformation campaign targeting the UN inspections has been generally unsuccessful. The wartime coalition has maintained its insistence on full Iraqi compliance with the Security Council Resolutions 687, 707, and 715 on weapons destruction and monitoring, and, barring a few exceptions, the Third World nations have followed suit. As detailed in this paper, Iraq has taken a four-pronged tactical approach:

- *"Legalistic" arguments*

Iraqi government representatives have consistently claimed that they have abided scrupulously by the provisions of UNSC Resolution 687 (requiring destruction of NBC weapons, and ballistic missiles with ranges greater than 150 kilometers, as well as their components and R&D facilities) and cooperated fully with the inspections. Rather, the claim has been that the inspectors (instigated by the U.S. government) have exceeded their mandate and infringed on Iraqi national sovereignty. Furthermore, the Iraqis have depicted President Bush as the "aggressive" international renegade defying legal constraints in an effort to overthrow Saddam Hussein and destroy Iraq.

- *"Humanitarian" arguments*

The state-controlled Iraqi media in particular have exploited and exaggerated the plight of innocent civilians suffering under the UN trade embargo. They have inflated mortality statistics and food shortages in the country. In addition, there is evidence that the regime is consciously withholding medical supplies from the population in order to earn international sympathy and build up domestic resentment against the UN. Another focus of Iraqi propaganda has been on alleged U.S. war atrocities and insensitivity to health and environmental hazards.

- *"Intelligence" arguments*

¹⁶⁹ Editorial, "Gunning for Iraq Again," in Karachi Dawn, July 16, 1991, p. 11, reprinted in FBIS-NES-91-142 (July 24, 1991) p. 55. For Indian Foreign Minister M.S. Solanki's view, see report of All India radio network, December 16, 1991, cited in FBIS-NES-91-241 (December 16, 1991), p. 80.

According to another Iraqi theme, the United States has transformed the inspection process into an espionage or sabotage operation designed to destroy the Iraqi industrial infrastructure. Events of the sixth IAEA inspection are interpreted to demonstrate the intelligence-collecting motives of David Kay, the Chief Inspector, and his colleagues. Information obtained by them was to be passed on to the Israeli Mossad.

- *Pan-Arab arguments*

Another theme of Iraqi propaganda is composed of appeals to Arab brotherhood in resisting Western "neo-imperialism." Exploitation of this theme is hampered by the fact that Saddam Hussein brutally occupied one Arab state (Kuwait) and attacked another (Saudi Arabia). State-controlled Iraqi media have tried to link the attempted "annihilation" of Iraq and the "oppression" of Palestinian people. Iraq has also organized meetings of "front" groups like the Popular Arab Forces Conference to "rubber-stamp" its position and to put pressure on Arab governments.

The response by Iraq's neighbors has been mostly negative. Only Libya, Yemen, and the PLO fully endorse the Iraqi stance. While other Arab governments still support UN resolutions on weapons destruction, there has been some wavering over imposition of the trade sanctions. This trend may demonstrate success for Iraqi emphasis on alleged civilian deprivations. However, it may be more indicative of the impact of losing a major trading partner, particularly for Jordan. Nevertheless, the propaganda campaign has failed to extricate Iraq from its isolation following the invasion of Kuwait.

SECTION 8

POTENTIAL BREAK-OUT SCENARIOS

Iraqi activities and behavior indicate that it has sought to retain equipment, materials, and expertise that could enable it to reestablish weapons capabilities proscribed under UN Resolution 687. The following hypothetical scenarios indicate plausible routes Iraq might take if it were to decide to rebuild its weapons programs. These scenarios are based on the assumption that UN activity in Iraq diminishes for one or more of several reasons:

- lack of funding from member states, caused in part by the strain of peacekeeping missions in several regions of the world;
- growing resentment by Arab and other developing countries that Iraq is being excessively punished;
- failure of the embargo; and
- lack of further UNSCOM discoveries.

The above assumptions are coupled with a potential politico-military environment that could provide the setting in which Iraq could reassert its power. The specific factors that could enable Iraq to reassert its power are:

- the retention of technical capabilities, including equipment and documentation;
- the retention of key scientific, engineering, and technical personnel;
- economic resources to finance weapons programs, particularly petroleum reserves; and
- personal motivation by the Iraqi leadership to reassert power.

The specific weapons that Iraq chooses are dependent in part on the national objectives it intends to achieve. For example, an objective such as the crushing of internal Shiite uprisings likely would lead to a different system than one of regaining power in the Arab world and countering Israel and other Middle Eastern powers.

Iraqi officials began plans for reconstructing various weapons capability even before UN intervention in their country had been terminated. The destruction process dealt a serious blow to Iraq's weapons programs, but Iraqi officials agreed that the re-integration of one or more of its dismantled weapons programs into the Iraqi armed forces must

receive top priority. Because the UNSCOM/IAEA inspections failed to discover any new evidence or weapons' programs, the UN was left with the false impression that a full and final disclosure had been given by Iraq. Iraq, two years after the end of inspections, is in a position once again to begin production of various weapons and weapons components at secret facilities that were not detected by UN inspection teams.

8.1 NUCLEAR WEAPONS SCENARIO.

Iraq, two years after the end of inspections, is in a position once again to begin small-scale production of weapons-grade uranium at secret facilities that were not detected by the UN. Several factors supported the new Iraqi nuclear program. Even before the period of UN intervention in their country had been terminated, Iraqi officials began plans for reconstructing a nuclear weapons capability. The destruction process dealt a serious blow to Iraq's efforts, but all Iraqi officials agreed that, given their prestige and military value, the integration of nuclear weapons into the Iraqi armed forces must receive top priority. Contrary to the judgment of UNSCOM/IAEA, Iraq today, two years after the end of inspections, is in a position once again to begin small-scale production of weapons-grade uranium at secret facilities that were not detected by the UN. Several factors supported the new Iraqi nuclear program.

First, the technical know-how behind the nuclear accomplishments still exist in Iraq. Iraq has retained the majority of its nuclear specialists, such as Dr. Jaffar Dhia Jaffar, who already have engaged in extensive nuclear weapons research and development and who are prepared to reproduce their work. During the inspection period, some were reassigned to other government jobs; others were sent abroad to continue their research in friendly countries as well as in top universities throughout the world, including in the U.S.. Most of the records relating to the nuclear program also were hidden and later retrieved. Before Desert Storm, Iraqi scientists succeeded in producing the technologies required for the electromagnetic isotope separation (EMIS) process and were seeking self-sufficiency in uranium enrichment through the production of gas centrifuges. Iraq plans to reconstitute its nuclear program utilizing these relatively simple and well-documented production techniques as a foundation.

Second, Iraq has committed its political and financial resources to the creation of a nuclear device as early as practical. A key motivation for this commitment is the prestige attributed to the possession of a nuclear weapon, and the potential political and military value that could be derived from a challenge against Israel. Consistent with its pre-war

commitment to the program, all available human and material resources have been dedicated to the development of nuclear weapons. As one Iraqi admitted to a UN inspector, there were no qualified engineers at the Al Kindi facility because they had been taken to the nuclear facility at Tuwaitha.

Third, Iraq has one of the world's largest petroleum reserves, giving it the resources required to finance the new program. Many companies abroad have shunned Baghdad's secret overtures to provide Iraq critical components and materials needed in the production process in exchange for hard currency. Iraq's willingness to pay well beyond the market rate for these items, however, has lured a few companies and several private citizens into cooperating with the program planners. To circumvent export control restrictions and UN sanction, Iraq has focused on attaining "intellectual capital", that is, skilled personnel and information needed to produce equipment rather than the equipment *per se*.

Fourth, Iraqi officials already have demonstrated their willingness to take enormous political risks to become a nuclear power. The UN and IAEA have invested extensive resources in monitoring and enforcing Iraqi compliance with Security Council Resolutions. However, international attention on Iraq and, therewith, effective monitoring of Iraqi activities have waned. Many Western countries are beginning to argue that too much money is being wasted to monitor Iraq's activities, especially given the strong evidence that Iraq is in full compliance with the postwar UN resolutions. With the world's attention focused on a potential crisis in South Asia, moreover, Baghdad has been able to take advantage of the distraction of world attention to proceed even more vigorously with its development plans. Iraq is enhancing the perception of its commitment to compliance with international laws by its outspoken support and cooperation with the inspections under the recently signed CWC.

During the UN inspections, Iraq successfully hid several gas centrifuges in nondescript locations around the country, including undisclosed operational facilities. While all of its weapons-grade nuclear material had been confiscated, Iraq did conceal some unprocessed uranium, and has recently begun reprocessing in secret small-scale plants. The centrifuges do not use or generate much energy, and therefore remain undetected by Western satellites. Many of the facility's powerlines have been channeled through underground conduits to further limit detection of the facilities. For over year, Iraq has been preparing a site for a very large and intricate cascade system of centrifuges for uranium enrichment, and it gradually has been acquiring the equipment required to

manufacture the centrifuges and the raw nuclear material to be processed. Baghdad estimates that one more year is necessary before it can manufacture enough uranium processing machines to go into full-scale production in the secret facility. The relatively simple small-scale production process will support Iraq's modest nuclear weapon production needs until more sophisticated and efficient techniques to produce weapons-grade nuclear material can be developed.

Iraq is also secretly engaged in nuclear R & D in Algeria, which before the war had agreed to take temporary custody of several tons of natural uranium and protect a number of Iraq's nuclear scientists. Algeria, which built a 15-megawatt nuclear reactor with Chinese assistance, thought that such an arrangement would be mutually beneficial. The Iraqi and Algerian governments believed that the production of an "Islamic bomb" would bring prestige to their countries, and they agreed to share technologies and expertise. Following the termination of the UNSCOM inspections, Iraq recalled the scientists from Algeria and ordered them to continue their research in Iraqi facilities.

Baghdad sought additional technical expertise from several regions of the world to help it proceed with the nuclear weapons program much more efficiently, rapidly, and cautiously than it had before. After carefully screening potential candidates, Iraq' approached several nuclear specialists from the former Soviet Union (FSU), many of whom accepted Iraq's offer in exchange for lucrative financial compensation. Occasionally, an isolated report surfaces that Iraq is employing a number of these specialists or purchasing nuclear technologies and materials from eager enterprises within the FSU. These reports are generally dismissed in the West and the UN because an insufficient pattern of such activity exists. The West can also not substantiate reports that some of the ex-Soviet Moslem republics have sold Iraq whole systems for uranium enrichment as well as raw uranium stockpiles.

Chinese and Pakistani agents have expressed a willingness to consult with Iraq on its nuclear program. Iraq expressed to Chinese officials its interest in China's feasibility study for building a camouflaged plutonium reactor in Iraq. The main failing of the previous Iraqi program was its inability to produce enough weapons-grade nuclear material to manufacture more than just a few bombs. Iraq already has a clandestine reactor, but Baghdad is not satisfied with the production potential of this very small-scale operation and would like to improve its capability. Baghdad believes, a larger, camouflaged reactor would be capable of operating undetected by the West's most sophisticated satellites, especially given the previous failure to detect many of Iraq's

nuclear facilities by satellite. A reactor with the potential to produce significant amounts of plutonium effectively would solve Iraq's nuclear supply problem.

Because Iraq was careful to hide most of the documents and records related to its nuclear program, as well as retain duplicates of all key documents seized by UN inspectors, it was capable of proceeding at a very quick pace. This is particularly true with the weapon design and the development of an implosion system. Iraq already is working to improve its expertise in uranium metallurgy and its development of high explosive lenses, detonators, and firing systems. It also ordered an engineering crew to develop the technology required to mount nuclear explosive warheads on its surface-to-surface missiles. Within a few short years, Iraq hopes to be able to deploy nuclear missiles in its arsenal.

8.2 CHEMICAL WEAPONS SCENARIOS.

8.2.1 CW Scenario 1.

Prior to initiation of UNSCOM inspections, Iraq removed and secured some chemical production equipment and documentation from its chemical weapons production sites at Al Muthanna. It also retained unfilled munitions and canisters and other weaponization capabilities.

After the UNSCOM inspection ended, Iraq conducted a study to define the mistakes that allowed Western intelligence to identify Al Muthanna, Fallujah and several storage sites so clearly. The Iraqi government also compiled a study on how to change Iraqi CW production and weaponization, based on what was learned by experts on the UNSCOM teams, either through inadvertent disclosures or eavesdropping. Iraq then undertook to build a secret underground facility for the purpose of producing limited quantities of chemical weapons. Simultaneously, Iraq began an international diplomacy campaign emphasizing its sincere commitment to refrain from CW activities. As a vestige of international compliance, Iraq joined the Chemical Weapons Convention and invited anytime-anywhere inspections above and beyond the requirements of the CWC. It volunteered to open all of its chemical facilities to continual UN monitoring.

Because Iraq did not have all of the precursor chemicals it needed for CW manufacture, Iraq determined that only the nerve agents GB and GF would be manufactured. Until an indigenous capability was established, however, small quantities

of precursors manufactured in developing countries without stringent export controls would continue to be imported.

Simultaneously, Iraq has increased efforts to develop precursors indigenously from readily available natural resources, including phosphorus, sulfur, chlorine, and fluorine. Using extensive national chemical manufacturing and processing capabilities, Iraq has had greater success in converting these basic chemicals into CW intermediates and precursors, including PCL_3 and DF. By developing an indigenous precursor manufacturing capability, Iraq can effectively circumvent international export controls.

To reduce reliance on imports of glass-lined reactors and other equipment, Iraq decided to use only equipment that it could make itself. The lower quality of the material will increase problems with corrosion, but Iraq is willing to incur the cost and inconvenience of changing vessels and piping as needed in exchange for reducing the risk of drawing international attention.

8.2.2 CW Scenario 2.

In addition to hiding equipment and documentation for future CW production Iraq hid agents and precursors. To facilitate the task of hiding the chemicals Iraq hid the agent in bulk rather than in weapons. Most of the chemicals were stored in Scud oxidizer containers, which are easily transported, and consequently easily concealed from international inspection and monitoring. The mustard agent is high purity (90%); the lack of contaminants allows for long term bulk storage of mustard. Nerve agent was not stable and required a different approach. The precursor chemicals were stored separately. Alcohols were stored in one set of containers or filled into munitions. DF was stored separately in others.

To increase the length of time that the agents would remain effective, Iraq sought to regulate their temperature. In addition to underground bunkers, Iraq placed storage containers in basements of nondescript buildings, including air-conditioned office buildings.

8.3 BIOLOGICAL WEAPONS SCENARIOS.

8.3.1 BW Scenario 1.

Having successfully misrepresented to the UN the true extent of the progress made in its BW program, Iraq decided to reactivate its BW R&D base. Even though it never had arrived at the stage where it could manufacture a reliable biological weapon, Iraq retained and concealed a significant number of sample BW agents, BW program personnel, and critical technical documents relating to agent development and weaponization.

While Iraq kept its BW activities to a minimum during the period of UN inspections, it in fact was able to employ a few of its top scientists and engineers to continue its research efforts in locations left undetected by Western intelligence sources. Much of the equipment, samples, and records were moved to these and other locations from the suspected sites like Salman Pak and Al Hakam. Baghdad is aware that the long-term monitoring activities of the UN only will pertain to a handful of known sites, where it, of course, has no intention of engaging in BW research.

Iraq managed to keep most of the important documents and records intact, so that when they were recovered they were a rich source of technical information that would allow Iraq to proceed very quickly. Utilizing its relatively significant reserve of people with expertise in this area, Iraq quickly reassembled a dedicated BW team. For some time, the import controls placed on Iraq have been weakening, allowing Iraqi agents abroad to purchase piecemeal some of the equipment, materials, and foreign expertise needed to improve its techniques and products. Iraq also began testing some of the drones it had developed before the war, intending to use them to disperse some BW agents, but it did so on a very limited scale to avoid arousing any suspicions in the rest of the world.

One of Baghdad's top priorities has become the small-scale construction of other sites more properly suited to BW R&D, possibly even underground. One secret site also includes an aerosol test chamber that was not discovered during UNSCOM inspections. Having paid close attention to the questions posed by the UN inspectors and to the sort of sites that tended to become suspect, Iraq used the information gleaned from such experiences to make the newer BW sites more efficient and secure (by better understanding the limits of western intelligence). Within a few years, Iraq goes from a position of having no stockpiles and weapons to secretly deploying a BW weapons arsenal capable of inflicting significant damage.

8.3.2 BW Scenario 2.

During the period of UN inspections, Iraq managed to hide its stockpiles of several types of pathogenetic agents. While some of the agents did not survive storage, the more hearty bacterial strains, like anthrax, were unaffected. It also was able to conceal several prototypes of BW delivery systems, including air- and truck-mounted aerosol generators, remotely piloted vehicles, and warheads to be mounted on Iraq's ballistic missiles.

The sites in Iraq being monitored by the UN in fact had been used to conduct significant BW research and development. One of those sites, Salman Pak, was used extensively by the Iraqis to do research on the weaponization of BW agents. Salman Pak was found by the inspectors to have extensive electronics research and manufacturing facilities, but no evidence was discovered to indicate that Iraq had or had tried to manufacture equipment to disseminate biological agents. During the five months prior to Desert Storm, Iraq made it a top priority to remove as much of this equipment from Salman Pak as it could. A concerted effort also was made to gather and remove all documents and plans from Salman Pak and several other facilities around Iraq engaged in BW research and development. Baghdad knew that the western and Israeli intelligence agencies believed that Iraq had a viable BW program at this facility. Iraq, therefore, expected Salman Pak to be destroyed in a war should it happen, and it wanted to salvage as much of the research and equipment as it could.

A number of hidden underground facilities were used to store most of the stockpiles and equipment. In order to evade detection by U.S. spy satellites, much of this activity took place under cover of darkness. The temporary disruption of the BW program also caused Iraq to disperse most of the program's personnel to other jobs, a tactic that also would help Baghdad to convince skeptical UN inspectors that Iraq's "discontinued" BW program had been small and received very little investment.

The UN inspectors had failed to uncover the true extent of Baghdad's BW program. As time passed and little about the BW program came to light, Saddam Hussein was encouraged to make every additional effort to keep it concealed. He knew that the BW program would be the only one of his mass-destruction weapon programs to survive essentially unscathed. He also recognized how vulnerable the troops in the coalition were to BW attacks, and that the presence of deadly agents on the battlefield could have seriously disrupted Allied military operations.

With the attention of the UN diverted to other crises around the globe, Iraq gradually was able to function with less and less international supervision. Indeed, the aggressive rhetoric and provocative actions of Iran caused many states to consider supporting Baghdad once again. Although it was able to operate its BW program without foreign support, Baghdad decided that it would be advantageous to reacquire some of the equipment and agent stocks that it lost during the war from foreign companies. Most of the equipment items fall into the "dual-use" category, so Iraq was able to deceive people involved and the international watchdog organizations into believing that it needs the equipment to improve its medical and research facilities.

8.4 BALLISTIC MISSILE SCENARIO.

To safeguard its ballistic missile program from potential foreign and domestic enemies, during the 1980s Iraq decided to build into its missile production program a number of redundancies, which meant essentially that it acquired from abroad multiples of machinery items required to assemble whole missile systems. Owing to Iraqi cleverness and certain ambiguities in Security Council Resolution 687 regarding the removal and destruction of Iraq's ballistic missile R&D and production facilities, Baghdad was able to conceal a significant part of its missile program from UN inspectors. The news that Iraq may have hidden 200 to 300 Scud-type missiles during the inspection period in reality was fairly accurate. More significantly, however, Iraq managed to retain much of the machinery as well as the technical experts and records required to produce short- and intermediate-range systems.

During Desert Shield, Iraq prepared for the worst despite its overt display of confidence that the Allied Coalition would not attack. Baghdad ordered all facilities involved in the production of ballistic missiles to be stripped of equipment (machine tools, jigs and dies related to production, and missile parts) and stored at other locations, including underground caverns. Stockpiles of missiles at the major storage areas also were split up and shipped out to new locations in preparation for war. Following the war, the stockpiles at the more suspicious locations once again were redistributed around the country so that the majority of Iraq's missiles were left undetected by the UN inspection teams. Given its experiences after Desert Storm, Iraq acquired greater familiarity with western intelligence practices, which has improved its ability to hide its missile assets. The result of Iraq's deception and concealment was that it retained a moderate-sized inventory of short- and intermediate-range missiles and a significant, though disassembled, missile-production capability.

During the period of UN inspections, Iraq's blustering and bullying helped it to protect its missile capabilities. While many of the earlier attempts to block the UN investigations were defeated, subsequent occasions of Iraqi obstinacy (usually prefaced by a lecture on the subject of Iraq's sovereignty) were not always adequately challenged. Suspicions were aroused that the Iraqi declarations (pursuant to Resolutions 687 and 707) did not match the country's actual missile inventory, but little evidence was uncovered to prove them incorrect.

Aside from Iraq's recovery of production equipment, documents, and technical personnel required to regenerate the missile program, other developments have assisted the program. Disagreements within the international community over how to handle Iraq led to a splintering in the unity that helped put Iraq down economically and politically. Economic sanctions have long since ceased to be effective. Attention on Iraq's internal activities has waned.

Iraq now receives support from a number of governments that once opposed it and, in some cases, has reestablished commercial ties with some companies abroad that Baghdad hopes will help it reacquire some the production equipment and materials lost to the UN demolition teams. Iraq initially proceeded haltingly with its postwar program because it was forced to work with inferior materials and inadequate machinery; but lately Iraq has improved on these conditions. Baghdad has exploited fully its access to weapons and components available in the former Warsaw Pact countries. Iraq also has cultivated ties with governments that could transfer to Iraq certain items that it could not manufacture, like missile guidance systems. The Missile Technology Control Regime (MTCR) has been expanded to include more countries, but there still remain significant loopholes that limit its effectiveness. Enforcement provisions are still lacking, and the signatory countries inconsistently adhere to the MTCR rules.

Iraq also managed to attract a number of missile experts from within the former Soviet Union and Germany as well as a few renegades from missile programs within developing countries. Iraq considers these foreign experts to be a vital part of its current ballistic missile program, because Baghdad has set its sights on the production of a fleet of more advanced intermediate- and possibly long-range systems. While Iraq's technical knowledge in this area has grown considerably, Baghdad desires to make up for some deficiencies and move the program along at a faster pace.

Finally, Iraq has boldly set about building a consortium similar to the one established to support the Condor program. Baghdad has managed to reignite Cairo's interest in such

a program. Iraq has acquiesced to Egypt's demand that Syria be included in the group. Negotiations with North Korea also have been going well. The new consortium has as its objective the development of intermediate- and long-range ballistic missiles. The countries involved figure too that it will be easier for them to circumvent export controls through the joint reestablishment of a network of foreign front companies. Despite the fact that much of the development will be done within their respective countries, the consortium participants also believe it will be easier to obtain from abroad certain materials and expertise required for the production of more sophisticated systems as well as to conduct ballistic missile tests.

Also to be counted among Iraq's advantages in this area is complacency in the international community. Indeed, the veneer of official "UN supervision" has served to protect Iraq's ballistic missile activities from close attention. Bilateral and multilateral initiatives in a number of western countries to investigate Iraq's activities have been shunted aside on the rationale that such inquiries are the primary reserve of the United Nations. The United Nations has argued that it has kept adequate tabs on Iraq's activities and that it would be near impossible for Iraq to reacquire a significant missile capability.

SECTION 9 CONCLUSIONS

The case of inspections in Iraq has been unique. Defeated in war, subject to anytime-anywhere inspections,¹⁷⁰ and with the constant threat of renewed of hostilities in the event of noncompliance--Iraq; nevertheless, has been defiant and crafty, and has avoided giving a full, detailed disclosure of their weapons and capabilities, as required by Resolution 687.

Although the inspections have been successful in identifying some of Iraq's previously unknown weapons capabilities; they probably have failed to uncover substantial quantities of weapons; production equipment; materials and precursor chemicals, and documentation. It is certain that, despite the intent of Resolution 687, Iraq will retain the technological base and know-how to reestablish the weapons programs once the inspection process winds down. It is also certain that Iraq will have learned a great deal about how to better hide its efforts and to resist international oversight.

Techniques used by Iraq to camouflage, conceal, and deceive have been fairly consistent across their four programs--nuclear, chemical, biological, and missile. Some of the primary techniques employed have been:

- Information has been withheld, manipulated, and/or distorted.

Declarations were inaccurate and incomplete, with changes being made continually. On many occasions, outright lies were told to the inspectors. Documentation usually had been removed or destroyed prior to inspection. When some documentation was found, it was confiscated. Inspectors were allowed to interact with only a limited set of Iraqis, all of whom were trained in what to say and were constantly videotaped.

- Equipment sometimes was removed before inspectors arrived.

Iraq had a long lead time between the end of hostilities and the initiation of inspections to remove equipment and obscure evidence of its activities. In the cases of nuclear, chemical, and missile programs, the removal of equipment was sometimes detected. The Iraqis tried to cover up the evidence of removal by various means, including ripping up flooring, tearing down structures, regrading earth, and placement of

¹⁷⁰Iraq ended a stand-off with UNSCOM inspectors in front of the Agricultural Ministry on July 22, 1992, denying them access to a site. Previously, such attempts by Iraq to disallow inspectors access has ended with Iraq's submission.

ordnance to deter inspection. In the case of the biological program, equipment removal would not be so obvious, as it would be smaller and its removal would not necessarily leave any evidence.

- Weapons and production equipment have been hidden and not declared.

Perhaps the clearest case of hiding equipment was when Iraqis loaded nuclear-related items on trucks and moved them around to evade detection by inspectors. Although these items were discovered, it is not clear that they were later inventoried and destroyed.

By definition, inspectors have been unable to find those items which have been successfully hidden. Missiles offer the best example of the problem. Undeclared mobile missiles remain in the Iraqi inventory. Inspectors have been unable to locate them.

- Iraq often successfully manipulated the inspections.

The time length of each inspection was limited and Iraq was aware of this. They used various means to expend time and meted out information slowly, so that it would be difficult for any inspection team to immediately follow-up on new leads. For example, Iraq would refrain from giving inspectors requested information until the inspection was nearly ended, thus assuring that the inspectors would not be able to undertake initiatives based on the Iraqi responses.

- Because the "rules" were not specified, Iraq took the initiative to set the agenda and timetable.

Iraq attempted to define the inspectors' rights and responsibilities narrowly. For example, they demanded that inspectors not photograph during the inspections (which initially was adhered to by some inspection teams). It also attempted to prevent the teams from using helicopters, a stance that was eventually overturned, but not without significant time delays. On other occasions, they took the initiative to establish definitions. For example, they sought to declare which items were dual-use, and therefore should not be destroyed.

- Iraq limited or denied access to some facilities.

Unexploded ordnance was found at the entrance of some bunkers and facilities. Most recently, a UNSCOM team, was withdrawn without gaining access to the Agricultural Ministry where documents and equipment related to weapons programs were suspected to be stored.

In addition to the lessons regarding the camouflage, concealment, and deception activities that may be encountered by verification inspections, there are lessons to be learned about the teams themselves. In particular, three lessons stand out. First the team leader must have exceptional management and interpersonal skills to enable him or her to be tough, adversarial, or gentle and cajoling, as needed. Second, the team must be expert in the technologies in question; it may not be enough to be a missile expert when a Scud expert is needed; it will not be sufficient to understand chemistry when the chemistry of chemical weapons is the issue. Third, team members must be trained. They need to know what their rights and responsibilities are, including the need for operational security.

Teams must be unencumbered by institutional culture and biases. There must be no fear of confrontation or other activities which could sour relations for the future. Inspectors must not be in a mode where they consider whether the inspected country will retaliate against them in the future.

Another key lesson from the Iraq inspections is that there has been excessive reliance on overhead photography for intelligence about Iraq's programs. Stated in other terms, there was a significant lack of human intelligence about Iraq's capabilities. This became obvious when Western intelligence agencies could not determine in advance of Desert Storm the scope or nature of Iraq's capabilities. The problem was also obvious in the inspections process. The most informative nuclear inspection, for example, resulted from information gained from a defector, not national technical means.

In a related vein, there may have been opportunities missed for valuable help in defining and overcoming Iraq's CCD practices. Russia could have volunteered experts in CCD practices to help disclose some of the techniques currently and previously employed by Iraq. Russia would be ideal in this role, not only because it has a history of masterful CCD itself, but because it has been Iraq's mentor for years. In particular, Russia might be able to help locate some of the Iraqi Scuds, which are similar to those supplied by the former USSR.

A final point to be made is that time is not on the side of inspections. Multinational efforts lose popularity and people grow weary of supporting them. For example, even though the inspections of Iraq benefit Kuwait and Saudi Arabia perhaps more than any other country, their contributions have been only at the level of \$1 or 2 million each. Large-scale investments--either in terms of time, money, or political support--are unlikely in the case of inspections. Without the strength of the U.S. commitment, UNSCOM

probably would have already ended. The lesson here is that any potential violator in the future may be able to "out wait" the inspections process through delays and denials, especially if accompanied by abuse or harassment. Unless the international community is as politicized and committed as it is in the case of Iraq, such a culprit may escape ramifications even if violations are strongly suspected.

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APPENDIX A

METHODOLOGY

The purpose of this project is to enumerate and analyze lessons learned from the UNSCOM inspections in Iraq that may be relevant to future verification efforts. Specific focus is on the camouflage, concealment, and deception activities of Iraq.

The methodology for this research project entailed three separate activities. First, the authors conducted background research on Iraqi weapons capabilities and the UNSCOM missions. These data were then used to prepare portions of this report and to compile key topics to be covered in interviews with UNSCOM inspectors.

Second, inspectors and UN personnel who have directly participated in the inspections were interviewed using a general outline of discussion topics as a guide. An example of one guide, for chemical inspections, is included below. The topics were selected based on types of information that could serve to identify vulnerabilities of verification, areas of operations and logistics that could be improved, and specific examples of Iraqi behavior and tactics used before, during, and after inspections. Each interview began with an explanation of the purpose of the project. Interviewees were encouraged to identify any "lessons learned" that were possibly not covered by the question guide. At the end of each interview, each person was asked, "Are there any lessons learned that you feel are important, but which have not been covered during the course of this interview?"

Interviews were conducted with UNSCOM headquarters officials and inspectors in all four weapons areas. 39 individuals were interviewed. Interviews lasted from half an hour to over three hours. Each interview was conducted using a guide such as the "Chemical Questionnaire" below. (The questionnaire was appropriately modified for missile, biological, and nuclear interviews.)

It is important to note with regard to the analyses on lessons learned that the authors have specifically sought to be accurate reporters of the impressions and observations of UNSCOM participants that were interviewed. The lessons learned contained in this report are therefore not the views of the authors. All lessons learned are drawn directly from the interviews and no observation is included unless one or more inspectors made the point.

The third portion of the methodology entailed using a variety of sources--interviews, Western press reports, and Iraqi government and press statements--to identify the set of tactics and techniques used by Iraq to conceal its programs and foil inspections.

Interview Guide for Iraq Project Interviews: Chemical Questionnaire

1. Brief interviewee on purpose of project and emphasize need to know their perceptions of lessons to be learned.

2. Define interviewee's role, sites visited & when, specific findings regarding Iraqi capabilities and assets. Ask specifics about:

3. Declarations

Were the declarations accurate?

What types of documentation were provided by Iraq?

Were documents authentic?

Assess the ease of relating declarations to stockpiles.

Assess the quality of bookkeeping.

Are there any specific lessons you think are applicable to future verification efforts?

4. Strategies for overt/covert acquisition of chemicals & equipment

Who were the suppliers?

What techniques did Iraq employ to purchase chemicals?

Were attempts made by Iraqis to hide foreign origin?

5. Preparations for inspections

Was special training required?

Assess the briefings and preparation for inspections.

Were preparations affected by multinational nature of inspections?

Was the length of time for preparation sufficient, too much?

How much of the preparation was by national governments; how much by UN?

Were there logistics problems?

6. Inspection teams

How many people are needed and of what types of expertise?

Were there problems in language, coordination?

Were all tasks appropriately covered by those along?

7. Sites

Was the site military or civilian?

Was it heavily damaged by bombing? By Iraqi activities?

What attempts were made to camouflage, conceal, or deceive?

8. Military involvement

Was the Iraqi military involved in production, maintenance activities?

Was it involved in the inspection process?

9. Equipment

What equipment was used?

Were there logistics problems?

Was the equipment adequate for the task?

Assess spoofability.

10. Inspection process

Assess the degree of Iraqi cooperation.

Describe the attitude of Iraqis.

Have the Iraqis declared everything, or is more likely to be hidden?

What was the effect of using protective suits?

Was there dependency on host for support, like oxygen for oxygen tanks?

11. Destruction

Did Iraq present obstructions?

Are plans and facilities adequate?

12. What is your assessment of the implications of the UNSCOM inspections for the CWC verification regime?

13. How does the knowledge before inspections compare with that after (i.e., how much did we not know)?

14. Are there any questions that we did not ask that would be useful in determining the lessons learned?

**APPENDIX B
LIST OF UNSCOM INSPECTIONS AND SITES**

ON-SITE INSPECTION/ MAJOR OBJECTIVE	DATES	SIZE OF TEAM	SITES VISITED
<p>UNSCOM 1/IAEA 1</p> <ul style="list-style-type: none"> • Verify accuracy and completeness of Iraqi declarations. • Conduct inspections of designated site under suspicion for undeclared nuclear activities or storage of undeclared equipment. • Develop overall picture of the nature, direction and capabilities of the Iraqi nuclear program 	15-21 May 91	34 (from 20 countries)	<p>Tuwaita</p> <p>Tarmiya</p> <p>Baghdad Institute of Technolgy</p>
<p>UNSCOM 2/CW 1</p> <ul style="list-style-type: none"> • Survey the Muthanna State Establishment to provide a description that will enable a subsequent full inspection. • Identify special hazards or problems. • Report signs of undeclared activities. • Define CW munitions present and determine if facilities can be used for destruction. 	9-14 Jun 91	25 (7 nations plus UN)	Al Muthanna
<p>UNSCOM 3/BM 1</p> <ul style="list-style-type: none"> • Inspect and verify declared missiles, associated major parts and equipment in Baghdad and Al Taji/Habbaniyah area. • Supervise destruction of these missiles/parts/equipment. 	1-7 July 91	21 (from 7 countries plus UN)	<p>Al Taji</p> <p>Habbaniyah</p> <p>Rasheed Camp</p> <p>Nabai</p>
<p>UNSCOM 4/IAEA 2</p> <ul style="list-style-type: none"> • Verify accuracy and completeness of Iraqi declarations. • Conduct inspections of designated sites under suspicion for undeclared nuclear activities or storage of undeclared equipment. • Develop overall picture of the nature, direction, and capabilities of Iraqi nuclear program [particularly electromagnetic isotope separation (EMIS) technique]. 	22 June-3 July 91	18 (from 8 countries)	<p>Tarmiya</p> <p>Abu Ghraib</p> <p>Al Hamath</p> <p>Zafarniya</p> <p>Al Dijila</p> <p>Al Rabeeh</p> <p>Al Musayyib (Al Atheer and Al Hatheen Establishment)</p> <p>Fallujah</p>

ON-SITE INSPECTION/ MAJOR OBJECTIVE	DATES	SIZE OF TEAM	SITES VISITED
<p>UNSCOM 5/IAEA 3</p> <ul style="list-style-type: none"> • Verify accuracy and completeness of updated (7 July) declarations. • Evaluate various Iraqi approaches to uranium enrichment. • Place nuclear material and equipment under seals. 	6-19 July 91	37 (from 22 countries) from 7-13 July, reduced to 20 from 13-19 July	<p>Tuwaitha</p> <p>Al Qaim</p> <p>Akashat</p> <p>Mosul Production Facility</p> <p>Tarmiya</p> <p>Ash Sharquat</p> <p>Engineering Research Center (near Tuwaitha)</p> <p>Al Qa Qaa</p>
<p>UNSCOM 6/IAEA 4</p> <ul style="list-style-type: none"> • Evaluate information gathered by third IAEA team. • Inspect new, designated sites; • Make a detailed assessment of the EMIS program. • Obtain a comprehensive picture of the centrifuge enrichment program. • Verify existence of activities relevant to weaponization. 	27 July-10 Aug 91	20 (from 11 countries)	<p>Tuwaitha</p> <p>State Establishment for Heavy Engineering Equipment</p> <p>Al Dura</p> <p>Badr General Establishment</p> <p>Auqba Bin Nafi Establishment</p> <p>Al Radwan</p> <p>Al Ameer</p> <p>Al Amin</p> <p>Tarmiya</p> <p>Al Furat</p> <p>Hatheen Establishment (Al Musayyib)</p> <p>Mosul (Al Jesira) Production Facility</p>
<p>UNSCOM 7/BW 1</p> <ul style="list-style-type: none"> • Describe the physical site, including any hazards. • Identify signs of undeclared activity. • Determine nature of BW munitions 	2-8 Aug 91	28	Salman Pak

ON-SITE INSPECTION/ MAJOR OBJECTIVE	DATES	SIZE OF TEAM	SITES VISITED
<p>UNSCOM 8/BM 3</p> <ul style="list-style-type: none"> • Inspect missile production facilities declared by Iraqi Govt. as destroyed. • Determine further destruction of equipment under UN SCR 687. • Survey declared supergun (SG) sites. • Inspect some undeclared missile sites. 	8-15 Aug 91	16 (from 8 countries plus UN)	<p>Fallujah</p> <p>Latifiyah</p> <p>Al Dawrah</p> <p>Al Musayyib</p> <p>Al Qa Qaa</p> <p>Habbaniyah</p> <p>Shahiyat</p> <p>Batra</p> <p>Jabal Hamrayn (SG)</p> <p>Sumaykah</p> <p>Iskandariyah (SG)</p>
<p>UNSCOM 9/CW 2</p> <ul style="list-style-type: none"> • Examine 3 undisclosed Fallujah facilities for signs of CW production or storage, or production of precursors. • Verify Iraqi declarations of munitions at Tammuz Air Base. 	15 to 22 Aug 91	22	<p>Al Muthanna; Fallujah sites 1, 2, and 3; Muhammadiyat Storage Site, Tammuz Air Base</p>
<p>UNSCOM 10/BM 2</p> <ul style="list-style-type: none"> • Verify information regarding additional Scud/Al Hussein missiles at Al Taji. 	18-19 July 91	6 (from 2 countries plus UN)	Al Taji
<p>UNSCOM 11/CW 3</p> <ul style="list-style-type: none"> • Verify declarations of CW munitions at Dujayl, Fallujah Proving Ground, and Al Bakr Air Base. • Collect data on munitions and chemical fill to prepare for transport and destruction. • If time allows, identify undeclared items or activity. • Visit undeclared sites. 	31 Aug-9 Sept 91	26 (10 nations plus UN)	<p>Dujayl</p> <p>Fallujah Proving Ground</p> <p>Al Bakr Air Base</p> <p>Fallujah GHQ Depot</p> <p>Al Taji Military Installation</p>

ON-SITE INSPECTION/ MAJOR OBJECTIVE	DATES	SIZE OF TEAM	SITES VISITED
UNSCOM 12/CW 4 <ul style="list-style-type: none"> • Supervise destruction of unfilled CW munitions at Muthanna. • Identify sites to collect and destroy CW agent in the future. 	1-4 Sept 91	10	Al Muthanna
UNSCOM 13/BM 4 <ul style="list-style-type: none"> • Inspect launch sites in Western Zone. • Destroy equipment found there. • Inspect declared and undeclared sites inside and outside the Western Zone. 	6-13 Sept 91	17 (from 8 countries plus UN)	Tikrit Al Sahra Khan al-Muhawil (Babylon Camp) Al-Dujayl *unable to visit Western Zone
UNSCOM 14/IAEA 5 <ul style="list-style-type: none"> • Verify seals previously placed on material and equipment. • Verify material present was as declared. • Remove bulk of plutonium from Iraq. • Take samples for destructive analysis. • Verify existence of activities relevant to weaponization. 	14-20 Sept 91	15 (from 13 countries)	Tuwaitaha
UNSCOM 15/BW2 <ul style="list-style-type: none"> • Determine possible involvement of inspected facilities in BW. • Describe sites and identify hazards and problems. • Describe any undeclared activities observed. 	20 Sept-3 Oct 91	13	Samarra Al Hakam Doura Fudaliyah Abu Ghuraib (Al Kindi Co.) Al-Ameriya Medical City, Baghdad Slaughter House, Baghdad An Najaf Taji

ON-SITE INSPECTION/ MAJOR OBJECTIVE	DATES	SIZE OF TEAM	SITES VISITED
UNSCOM 16 IAEA 6 <ul style="list-style-type: none"> • Obtain conclusive evidence that Iraq had program for developing implosion-type nuclear weapons 	22-30 Sept 91	44	Nuclear Design Center (Baghdad) Petrochemical-3 Headquarters (Baghdad) IAEC Training Center Reactor Siting and Planning Building Meeting House
UNSCOM 17/CW 5 <ul style="list-style-type: none"> • Catalog all agents, munitions, precursors. • Identify hazards and problems relevant to future destruction. • Examine structures and facilities, including the pesticide plant, and recommend future disposition. 	27 Sept-14 Nov 91	56	Al Muthanna
UNSCOM 18/BM 5 <ul style="list-style-type: none"> • Inspect launch sites in Western Zone. • Verify destruction at supergun (SG) sites. 	1-14 Oct 91		Western Zone Scud launch sites Jabal Hamrayn (SG) Iskandariyah (SG) Sumaykah (SG) 16 additional undeclared sites

ON-SITE INSPECTION/ MAJOR OBJECTIVE	DATES	SIZE OF TEAM	SITES VISITED
<p>UNSCOM 19/IAEA 7</p> <ul style="list-style-type: none"> • Assess extent of Iraqi studies and experiments directed toward developing nuclear weapons. • Further investigate work done and progress made in uranium enrichment, particularly by the centrifuge method. • Continue work of fifth IAEA team in measuring and verifying declared nuclear material. 	11-22 Oct 91	39 (from 17 countries)	<p>Tuwaita</p> <p>Al Atheer</p> <p>Baghdad University</p> <p>Al Hadre</p> <p>Nuclear Design Center (Baghdad)</p> <p>Petrochemical-3 HQ (Baghdad)</p> <p>Al Furat</p> <p>Abu Sukhayr</p> <p>Badr General Establishment, State Establishment for Heavy Engineering Equipment</p> <p>Saddam Engineering Complex</p> <p>Al Radwan</p> <p>Al Amir</p> <p>Salladine</p> <p>Dijila</p> <p>Al Ameen</p> <p>Ash Shakyli</p> <p>Al Qaim</p> <p>Al Qa Qaa Al Jesira</p> <p>Ash Sharqat</p>
<p>UNSCOM 20/CW 6</p> <ul style="list-style-type: none"> • Verify Iraqi declarations. • Take random samples to determine state of CW agents. 	22 Oct-11 Nov 91	27 (11 nations plus UN)	<p>Saddam Air Base</p> <p>Al-Tuz Airfield</p> <p>Khamisiyah Storage Site</p> <p>Qadisiyah Air Base</p> <p>Muhammadiyah Storage Site</p>

ON-SITE INSPECTION/ MAJOR OBJECTIVE	DATES	SIZE OF TEAM	SITES VISITED
<p>UNSCOM 21/CBW 1</p> <ul style="list-style-type: none"> • Conduct short-notice inspections of 14 undeclared sites to obtain site descriptions and identify any undeclared activities. • Verify destruction of missile launcher at Saddam Air Base. 	18 Nov-1 Dec 91	19	<p>Fallujah</p> <p>Salman Pak (4 areas)</p> <p>Mosul Airfield</p> <p>Mosul Sugar Factory</p> <p>Mosul Ammunition Depot</p> <p>Kirkuk Airfield Storage, and Ammunition and Storage Depot</p> <p>Baiji Storage Facility</p> <p>K2 and K3 Airfields</p> <p>Bunkered Storage North of K3</p> <p>Mansuriyah Storage Facility</p> <p>Ad Diwaniya Storage Facility</p> <p>Karbala Storage Facility</p> <p>Al Muhammadi Airfield</p>
<p>UNSCOM 22/IAEA 8</p> <ul style="list-style-type: none"> • Continue field activities to investigate foreign procurement sources. • Assess Iraqi nuclear weaponization program. • Supervise destruction of declared equipment. • Remove highly enriched uranium (HEU) fuel from Iraq. • Finalize verification of nuclear material at Tuwaitha site. 	11-18 Nov 91	12 inspectors plus supporting staff (from 16 countries)	<p>Tarmiya</p> <p>Badr</p> <p>Huba-bin-Nafi State Establishment</p> <p>Tuwaitha</p> <p>El-Amil Liquid Nitrogen Plant</p> <p>Karich Water Treatment Plant</p> <p>Al Qa Qaa</p>
<p>UNSCOM 23/BM 6</p> <ul style="list-style-type: none"> • Verify destruction of Western Zone launch pads. • Visit several possible missile sites. 	1-9 Dec 91		<p>Western Region: Mosul</p> <p>Al Dour</p> <p>2 sites near Baghdad</p>

ON-SITE INSPECTION/ MAJOR OBJECTIVE	DATES	SIZE OF TEAM	SITES VISITED
<p>UNSCOM 24/BM 7</p> <ul style="list-style-type: none"> • Inspect ammunition depot and several undeclared sites. 	9-17 Dec 91		<p>Haditha Ammunition Depot</p> <p>Sites near Baghdad: Police Directorate, Sports Club, Education Directorate</p>
<p>UNSCOM 27/IAEA 9</p> <ul style="list-style-type: none"> • Verify information received from Germany concerning procurement by Iraq of stock materials and components needed in the manufacturing of gas centrifuges for the production of enriched uranium. • Visit previously inspected sites to verify existence of machine-tools which might have been associated with the centrifuge enrichment program. 	11-14 Jan 92	14 (from 8 countries)	<p>Ministry of Foreign Affairs (Baghdad)</p> <p>Tuwaita</p> <p>State Establishment for Mechanical Works (Iskandariya)</p> <p>Nasr Establishment (Taji)</p> <p>Schaula</p> <p>Rashdiya complex (near Baghdad North Bridge)</p>
<p>UNSCOM 28/BM8</p> <ul style="list-style-type: none"> • Destroy missile production equipment earlier earmarked for destruction by UNSCOM 8 • Catalog equipment at newly-accessible sites • Inspect four declared sites being rebuilt • Conduct three inspections of undeclared sites • Unable to secure destruction of earmarked equipment 	21-28 Feb 92	12 (from 5 countries plus UN)	<p>Taji</p> <p>3 Bulat al Shuhadda sites:</p> <p>Taj al Soll Ma'arik</p> <p>Al Yawm al Azim</p> <p>Dhu al Fiqat</p> <p>Karama Electronics</p> <p>Al Qa Qaa</p>

ON-SITE INSPECTION/ MAJOR OBJECTIVE	DATES	SIZE OF TEAM	SITES VISITED
<p>UNSCOM 30/IAEA 10</p> <ul style="list-style-type: none"> • Inspect new sites designated by UNSCOM. • Follow up activities from previous inspections. • Provide technical support to UNSCOM-30 (ballistic missile inspection team). 	5-13 Feb 92	31 (from 14 countries)	<p>Salah-al-Din General Establishment (SAAD-13)</p> <p>Tuwaita Transport and Engineering Services Centers</p> <p>Future Design Center (Baghdad)</p> <p>Latifiya Agricultural Farm</p> <p>Badush Cement Works</p> <p>North Mosul Prison Complex</p> <p>Badush Dam and Construction Support Area</p> <p>Mosul Military Production Facilities (SAAD-24)</p> <p>Mosul Construction Support Facility</p> <p>Ministry of Industry and Minerals Computer Center</p> <p>Al Qa Qaa</p> <p>Al Atheer</p> <p>Badr</p> <p>Al Furat</p> <p>Rashkiya</p>
<p>UNSCOM 31/BM 9</p> <ul style="list-style-type: none"> • Verify new Iraqi declaration of ballistic missiles and launchers 	21-30 Mar 92		Taji
<p>UNSCOM 34/BM 10</p> <ul style="list-style-type: none"> • Verify destruction of Iraqi launchers, missiles, and the missile production equipment previously declared by UNSCOM but which UNSCOM 28 was unable to destroy. • Inspect some undeclared sites 	13-21 Apr 92	12 (from 5 countries plus UN)	<p>Taji</p> <p>3 Bulat al Shuhadda sites:</p> <p>Taj al Soll Ma'arik</p> <p>Al Yawm al Azim</p> <p>Dhu al Fiqat</p> <p>Al Qa Qaa</p>

APPENDIX C

United Nations Security Council Resolution 687 (1991)

The Security Council,

Recalling its resolutions 660 (1990) of 2 August 1990, 661 (1990) of 6 August 1990, 662 (1990) of 9 August 1990, 664 (1990) of 18 August 1990, 665 (1990) of 25 August 1990, 666 (1990) of 13 September 1990, 667 (1990) of 16 September 1990, 669 (1990) of 24 September 1990, 670 (1990) of 25 September 1990, 674 (1990) of 29 October 1990, 677 (1990) of 28 November 1990, 678 (1990) of 29 November 1990 and 686 (1991) of 2 March 1991,

Welcoming the restoration to Kuwait of its sovereignty, independence and territorial integrity and the return of its legitimate Government,

Affirming the commitment of all Member States to the sovereignty, territorial integrity and political independence of Kuwait and Iraq, and noting the intention expressed by the Member States cooperating with Kuwait under paragraph 2 of resolution 678 (1990) to bring their military presence in Iraq to an end as soon as possible consistent with paragraph 8 of resolution 686 (1991),

Reaffirming the need to be assured of Iraq's peaceful intentions in the light of its unlawful invasion and occupation of Kuwait,

Taking note of the letter sent by the Minister for Foreign Affairs of Iraq on 27 February 1991 and those sent pursuant to resolution 686 (1991),

Noting that Iraq and Kuwait, as independent sovereign States, signed at Baghdad on 4 October 1963 "Agreed Minutes Between the State of Kuwait and the Republic of Iraq Regarding the Restoration of Friendly Relations, Recognition and Related Matters", thereby recognizing formally the boundary between Iraq and Kuwait and the allocation of islands, which were registered with the United Nations in accordance with Article 102 of the Charter of the United Nations and in which Iraq recognized the independence and complete sovereignty of the State of Kuwait within its borders as specified and accepted in the letter of the Prime Minister of Iraq dated 21 July 1932, and as accepted by the Ruler of Kuwait in his letter dated 10 August 1932,

Conscious of the need for demarcation of the said boundary,

Conscious also of the statements by Iraq threatening to use weapons in violation of its obligations under the Geneva Protocol for the Prohibition of the Use in War of Asphyxiating, Poisonous or Other Gases, and of Bacteriological Methods of Warfare, signed at Geneva on 17 June 1925, and of its prior use of chemical weapons and affirming that grave consequences would follow any further use by Iraq of such weapons,

Recalling that Iraq has subscribed to the Declaration adopted by all States participating in the Conference of States Parties to the 1925 Geneva Protocol and Other Interested States, held in Paris from 7 to 11 January 1989, establishing the objective of universal elimination of chemical and biological weapons,

Recalling also that Iraq has signed the Convention on the Prohibition of the Development, Production and Stockpiling of Bacteriological (Biological) and Toxin Weapons and on their Destruction, of 10 April 1972,

Noting the importance of Iraq ratifying this Convention,

Noting moreover the importance of all States adhering to this Convention and encouraging its forthcoming Review Conference to reinforce the authority, efficiency and universal scope of the Convention,

Stressing the importance of an early conclusion by the Conference on Disarmament of its work on a Convention on the Universal Prohibition of Chemical Weapons and of universal adherence thereto,

Aware of the use by Iraq of ballistic missiles in unprovoked attacks and therefore of the need to take specific measures in regard to such missiles located in Iraq,

Concerned by the reports in the hands of Member States that Iraq has attempted to acquire materials for a nuclear-weapons programme contrary to its obligations under the Treaty on the Non-Proliferation of Nuclear Weapons of 1 July 1968,

Recalling the objective of the establishment of a nuclear-weapons-free zone in the region of the Middle East,

Conscious of the threat that all weapons of mass destruction pose to peace and security in the area and of the need to work towards the establishment in the Middle East of a zone free of such weapons,

Conscious also of the objective of achieving balanced and comprehensive control of armaments in the region,

Conscious further of the importance of achieving the objectives noted above using all available means, including a dialogue among the States of the region,

Noting that resolution 686 (1991) marked the lifting of the measures imposed by resolution 661 (1990) in so far as they applied to Kuwait,

Noting that despite the progress being made in fulfilling the obligations of resolution 686 (1991), many Kuwaiti and third country nationals are still not accounted for and property remains unreturned,

Recalling the International Convention against the Taking of Hostages, opened for signature at New York on 18 December 1979, which categorizes all acts of taking hostages as manifestations of international terrorism,

Deploing threats made by Iraq during the recent conflict to make use of terrorism against targets outside Iraq and the taking of hostages by Iraq,

Taking note with grave concern of the reports of the Secretary General of 20 March 1991 and 28 March 1991, and conscious of the necessity to meet urgently the humanitarian needs in Kuwait and Iraq,

Bearing in mind its objective of restoring international peace and security in the area as set out in recent resolutions of the Security Council,

Conscious of the need to take the following measures acting under Chapter VII of the Charter,

1. **Affirms** all thirteen resolutions noted above, except as expressly changed below to achieve the goals of this resolution, including a formal cease-fire;

A

2. **Demands** that Iraq and Kuwait respect the inviolability of the international boundary and the allocation of islands set out in the "Agreed Minutes Between the State of Kuwait and the Republic of Iraq Regarding the Restoration of Friendly Relations, Recognition and Related Matters", signed by them in the exercise of their sovereignty at Baghdad on 4 October 1963 and registered with the United Nations and published by the United Nations in document 7063, United Nations, Treaty Series, 1964;
3. **Calls upon** the Secretary-General to lend his assistance to make arrangements with Iraq and Kuwait to demarcate the boundary between Iraq and Kuwait, drawing on appropriate material, including the map transmitted by Security Council document S/22412 and to report back to the Security Council within one month;
4. **Decides** to guarantee the inviolability of the above-mentioned international boundary and to take as appropriate all necessary measures to that end in accordance with the Charter of the United Nations;

B

5. **Requests** the Secretary-General, after consulting with Iraq and Kuwait, to submit within three days to the Security Council for its approval a plan for the immediate deployment of a United Nations observer unit to monitor the Khor Abdullah and a demilitarized zone, which is hereby established, extending ten kilometres into Iraq and five kilometres into Kuwait from the boundary referred to in the "Agreed Minutes Between the State of Kuwait and the Republic of Iraq Regarding the Restoration of Friendly Relations, Recognition and Related Matters" of 4 October 1963; to deter violations of the boundary through its presence in and surveillance of the demilitarized zone; to observe any hostile or potentially hostile action mounted from the territory of one State to the other; and for the Secretary-General to report regularly to the Security Council on the operations of the unit, and immediately if there are serious violations of the zone or potential threats to peace;
6. **Notes** that as soon as the Secretary-General notifies the Security Council of the completion of the deployment of the United Nations observer unit, the conditions will be established for the Member States cooperating with Kuwait in accordance with resolution 678 (1990) to bring their military presence in Iraq to an end consistent with resolution 686 (1991);

C

7. **Invites** Iraq to reaffirm unconditionally its obligations under the Geneva Protocol for the Prohibition of the Use in War of Asphyxiating, Poisonous or Other Gases, and of Bacteriological Methods of Warfare, signed at Geneva on 17 June 1925, and to ratify the Convention on the Prohibition of the

Development, Production and Stockpiling of Bacteriological (Biological) and Toxin Weapons and on Their Destruction, of 10 April 1972;

- 8 Decides** that Iraq shall unconditionally accept the destruction, removal, or rendering harmless, under international supervision, of:
- a** All chemical and biological weapons and all stocks of agents and all related subsystems and components and all research, development, support and manufacturing facilities;
 - b** All ballistic missiles with a range greater than 150 kilometres and related major parts, and repair and production facilities;
- 9 Decides**, for the implementation of paragraph 8 above, the following:
- a** Iraq shall submit to the Secretary-General, within fifteen days of the adoption of the present resolution, a declaration of the locations, amounts and types of all items specified in paragraph 8 and agree to urgent, on-site inspection as specified below;
 - b** The Secretary-General, in consultation with the appropriate Governments and, where appropriate, with the Director-General of the World Health Organization, within forty-five days of the Passage of the present resolution, shall develop, and submit to the Council for approval, a plan calling for the completion of the following acts within forty-five days of such approval:
 - i** The forming of a Special Commission, which shall carry out immediate on-site inspection of Iraq's biological, chemical and missile capabilities, based on Iraq's declarations and the designation of any additional locations by the Special Commission itself;
 - ii** The yielding by Iraq of possession to the Special commission for destruction, removal or rendering harmless, taking into account the requirements of public safety, of all items specified under paragraph 8 (a) above, including items at the additional locations designated by the Special Commission under paragraph 9 (b) (i) above and the destruction by Iraq, under the supervision of the Special Commission, of all its missile capabilities, including launchers, as specified under paragraph 8 (b) above;
 - iii** The provision by the Special Commission of the assistance and cooperation to the Director-General of the International Atomic Energy Agency required in paragraphs 12 and 13 below:
- 10 Decides** that Iraq shall unconditionally undertake not to use, develop, construct or acquire any of the items specified in paragraphs 8 and 9 above and requests the Secretary-General, in consultation with the Special Commission, to develop a plan for the future ongoing monitoring and verification of Iraq's compliance with this paragraph, to be submitted to the Security Council for approval within one hundred and twenty days of the passage of this resolution:
- 11 Invites** Iraq to reaffirm unconditionally its obligations under the "Treaty on the Non-Proliferation of Nuclear Weapons of 1 July 1968;
- 12 Decides** that Iraq shall unconditionally agree not to acquire or develop nuclear weapons or nuclear-weapons-usable material or any subsystems or components

or any research, development, support or manufacturing facilities related to the above; to submit to the Secretary-General and the Director-General of the International Atomic Energy Agency within fifteen days of the adoption of the present resolution a declaration of the locations, amounts, and types of all items specified above; to place all of its nuclear-weapons-usable materials under the exclusive control, for custody and removal, of the International Atomic Energy Agency, with the assistance and cooperation of the Special Commission as provided for in the plan of the Secretary-General discussed in paragraph 9 (b) above; to accept, in accordance with the arrangements provided for in paragraph 13 below, urgent on-site inspection and the destruction, removal or rendering harmless as appropriate of all items specified above; and to accept the plan discussed in paragraph 13 below for the future ongoing monitoring and verification of its compliance with these undertakings;

- 13 **Requests** the Director-General of the International Atomic Energy Agency, through the Secretary-General, with the assistance and cooperation of the Special Commission as provided for in the plan of the Secretary-General in paragraph 9 (b) above, to carry out immediate on-site inspection of Iraq's nuclear capabilities based on Iraq's declarations and the designation of any additional locations by the Special Commission; to develop a plan for submission to the Security Council within forty-five days calling for the destruction, removal, or rendering harmless as appropriate of all items listed in paragraph 12 above; to carry out the plan within forty-five days following approval by the Security Council; and to develop a plan, taking into account the rights and obligations of Iraq under the Treaty on the Non-Proliferation of Nuclear Weapons of 1 July 1968, for the future ongoing monitoring and verification of Iraq's compliance with paragraph 12 above, including an inventory of all nuclear material in Iraq subject to the Agency's verification and inspections of the international Atomic Energy Agency to confirm that the Agency's safeguards cover all relevant nuclear activities in Iraq, to be submitted to the Security Council for approval within one hundred and twenty days of the passage of the present resolution;
- 14 **Takes note** that the actions to be taken by Iraq in paragraphs 8, 9, 10, 11, 12 and 13 of the present resolution represent steps towards the goal of establishing in the Middle East a zone free from weapons of mass destruction and all missiles for their delivery and the objective of a global ban on chemical weapons;

D

- 15 **Requests** the Secretary-General to report to the Security Council on the steps taken to facilitate the return of all Kuwaiti property seized by Iraq, including a list of any property that Kuwait claims has not been returned or which has not been returned intact;

E

- 16 **Reaffirms** that Iraq, without prejudice to the debts and obligations of Iraq arising prior to 2 August 1990, which will be addressed through the nominal mechanisms, is liable under international law for any direct loss, damage, including environmental damage and the depletion of natural resources, or injury to foreign Governments, nationals and corporations, as a result of Iraq's unlawful invasion and occupation of Kuwait;

- 17 **Decides** that all Iraqi statements made since 2 August 1990 repudiating its foreign debt are null and void, and demands that Iraq adhere scrupulously to all of its obligations concerning servicing and repayment of its foreign debt;
- 18 **Decides** also to create a fund to pay compensation for claims that fall within paragraph 16 above and to establish a Commission that will administer the fund;
- 19 **Directs** the Secretary-General to develop and present to the Security Council for decision, no later than thirty days following the adoption of the present resolution, recommendations for the fund to meet the requirement for the payment of claims established in accordance with paragraph 18 above and for a programme to implement the decisions in paragraphs 16, 17 and 18 above, including: administration of the fund; mechanisms for determining the appropriate level of Iraq's contribution to the fund based on a percentage of the value of the exports of petroleum and petroleum products from Iraq not to exceed a figure to be suggested to the Council by the Secretary-General, taking into account the requirements of the people of Iraq, Iraq's payment capacity as assessed in conjunction with the international financial institutions taking into consideration external debt service, and the needs of the Iraqi economy; arrangements for ensuring that payments are made to the fund; the process by which funds will be allocated and claims paid; appropriate procedures for evaluating losses, listing claims and verifying their validity and resolving disputed claims in respect of Iraq's liability as specified in paragraph 16 above; and the composition of the Commission designated above;

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- 20 **Decides**, effective immediately, that the prohibitions against the sale or supply to Iraq of commodities or products, other than medicine and health supplies, and prohibitions against financial transactions related thereto contained in resolution 661 (1990) shall not apply to foodstuffs notified to the Security Council Committee established by resolution 661 (1990) concerning the situation between Iraq and Kuwait or, with the approval of that Committee, under the simplified and accelerated "no-objection" procedure, to materials and supplies for essential civilian needs as identified in the report of the Secretary-General dated 20 March 1991, and in any further findings of humanitarian need by the Committee;
- 21 **Decides** that the Security Council shall review the provisions of paragraph 20 above every sixty days in the light of the policies and practices of the Government of Iraq, including the implementation of all relevant resolutions of the Security Council, for the purpose of determining whether to reduce or lift the prohibitions referred to therein;
- 22 **Decides** that upon the approval by the Security Council of the programme called for in paragraph 19 above and upon Council agreement that Iraq has completed all actions contemplated in paragraphs 8, 9, 10, 11, 12 and 13 above, the prohibitions against the import of commodities and products originating in Iraq and the prohibitions against financial transactions related thereto contained in resolution 661 (1990) shall have no further force or effect;
- 23 **Decides** that, pending action by the Security Council under paragraph 22 above, the Security Council Committee established by resolution 661 (1990) shall be empowered to approve, when required to assure adequate financial resources on

the part of Iraq to carry out the activities under paragraph 20 above, exceptions to the prohibition against the import of commodities and products originating in Iraq;

- 24 **Decides** that, in accordance with resolution 661 (1990) and subsequent related resolutions and until a further decision is taken by the Security Council, all States shall continue to prevent the sale or supply, or the promotion or facilitation of such sale or supply, to Iraq by their nationals, or from their territories or using their flag vessels or aircraft, of:
- a Arms and related *materiel* of all types, specifically including the sale or transfer through other means of all forms of conventional military equipment, including for paramilitary forces, and spare parts and components and their means of production, for such equipment;
 - b Items specified and defined in paragraphs 8 and 12 above not otherwise covered above;
 - c Technology under licensing or other transfer arrangements used in the production, utilization or stockpiling of items specified in subparagraphs (a) and (b) above;
 - d Personnel or materials for training or technical support services relating to the design, development, manufacture, use, maintenance or support of items specified in subparagraphs (a) and (b) above;
- 25 **Calls** upon all States and international organizations to act strictly in accordance with paragraph 24 above, notwithstanding the existence of any contracts, agreements, licenses or any other arrangements;
- 26 **Requests** the Secretary-General, in consultation with appropriate Governments, to develop within sixty days, for the approval of the Security Council, guidelines to facilitate full international implementation of paragraphs 24 and 25 above and paragraph 27 below, and to make them available to all States and to establish a procedure for updating these guidelines periodically;
- 27 **Calls** upon all States to maintain such national controls and procedures and to take such other actions consistent with the guidelines to be established by the Security Council under paragraph 26 above as may be necessary to ensure compliance with the terms of paragraph 24 above, and calls upon international organizations to take all appropriate steps to assist in ensuring such full compliance;
- 28 **Agrees** to review its decisions in paragraphs 22, 23, 24 and 25 above, except for the items specified and defined in paragraphs 8 and 12 above, on a regular basis and in any case one hundred and twenty days following passage of the present resolution, taking into account Iraq's compliance with the resolution and general progress towards the control of armaments in the region;
- 29 **Decides** that all States, including Iraq, shall take the necessary measures to ensure that no claim shall lie at the instance of the Government of Iraq, or of any person or body in Iraq, or of any person claiming through or for the benefit of any such person or body, in connection with any contract or other transaction

where its performance was affected by reason of the measures taken by the Security Council in resolution 661 (1990) and related resolutions;

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- 30 **Decides** that, in furtherance of its commitment to facilitate the repatriation of all Kuwaiti and third country nationals, Iraq shall extend all necessary cooperation to the international Committee of the Red Cross, providing lists of such persons, facilitating the access of the International Committee of the Red Cross to all such persons wherever located or detained and facilitating the search by the International Committee of the Red Cross for those Kuwaiti and third country nationals still unaccounted for;
- 31 **Invites** the International Committee of the Red Cross to keep the Secretary-General apprised as appropriate of all activities undertaken in connection with facilitating the repatriation or return of all Kuwaiti and third country nationals or their remains present in Iraq on or after 2 August 1990;

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- 32 **Requires** Iraq to inform the Security Council that it will not commit or support any act of international terrorism or allow any organization directed towards commission of such acts to operate within its territory and to condemn unequivocally and renounce all acts, methods and practices of terrorism;
- 33 **Declares** that, upon official notification by Iraq to the Secretary-General and to the Security Council of its acceptance of the provisions above, a formal cease-fire is effective between Iraq and Kuwait and the Member States cooperating with Kuwait in accordance with resolution 678 (1990);
- 34 **Decides** to remain seized of the matter and to take such further steps as may be required for the implementation of the present resolution and to secure peace and security in the area.

APPENDIX D

United Nations Security Council Resolution 707 (1991)

The Security Council,

Recalling its resolution 687 (1991), and its other resolutions on this matter,

Recalling the letter of 11 April 1991 from the President of the Security Council to the Permanent Representative of Iraq to the United Nations (S/22485) noting that on the basis of Iraq's written agreement (S/22456) to implement fully resolution 687 (1991) the preconditions established in paragraph 33 of that resolution for a cease-fire had been met,

Noting with grave concern the letters dated 26 June 1991 (S/22739), 28 June 1991 (S/22743) and 4 July 1991 (S/22761) from the Secretary-General, conveying information obtained from the Executive Chairman of the Special Commission and the Director-General of the IAEA which establishes Iraq's failure to comply with its obligations under resolution 687 (1991),

Recalling further the statement issued by the President of the Security Council on 28 June 1991 (S/22746) requesting that a high-level mission consisting of the Chairman of the Special Commission, the Director-General of the IAEA, and the Under-Secretary-General for Disarmament Affairs be dispatched to meet with officials at the highest levels of the Government of Iraq at the earliest opportunity to obtain written assurance that Iraq will fully and immediately cooperate in the inspection of the locations identified by the Special Commission and present for immediate inspection any of those items that may have been transported from those locations,

Dismayed by the report of the high-level mission to the Secretary-General (S/22761) on the results of its meetings with the highest levels of the Iraqi Government,

Gravely concerned by the information provided to the Council by the Special Commission and the IAEA on 15 July 1991 (S/22788) and 25 July 1991 (S/22837) regarding the actions of the Government of Iraq in flagrant violation of resolution 687 (1991),

Gravely concerned also by the evidence in the letter of 7 July 1991 from the minister of Foreign Affairs of Iraq to the Secretary-General and in subsequent statements and findings that Iraq's notifications of 18 and 28 April were incomplete and that it had concealed activities, which both constituted material breaches of its obligations under resolution 687 (1991),

Noting also from the letters dated 26 June 1991 (S/22739), 28 June 1991 (S/22743) and 4 July 1991 (S/22761) from the Secretary-General that Iraq has not fully complied with all of its undertakings relating to the privileges, immunities and facilities to be accorded to the Special Commission and the IAEA inspection teams mandated under resolution 687 (1991),

Affirming that in order for the Special Commission to carry out its mandate under paragraph 9 (b) (i), (ii) and (iii) of resolution 687 (1991) to inspect Iraq's chemical and biological weapons and ballistic missile capabilities and to take possession of them for destruction, removal or rendering harmless, full disclosure on the part of Iraq as required in paragraph 9 (a) of resolution 687 (1991) is essential,

Affirming that in order for the IAEA, with the assistance and cooperation of the Special Commission, to determine what nuclear-weapons-usable material or any subsystems or components or any research, development, support or manufacturing facilities related to them need, in accordance with paragraph 13 of resolution 687 (1991), to be destroyed, removed or rendered harmless, Iraq is required to make a declaration of all its nuclear programmes including any which it claims are for purposes not related to nuclear-weapons-usable material,

Affirming that the aforementioned failures of Iraq to act in strict conformity with its obligations under resolution 687 (1991) constitutes a material breach of its acceptance of the relevant provisions of resolution 687 (1991) which established a cease-fire and provided the conditions essential to the restoration of peace and security in the region,

Affirming further that Iraq's failure to comply with its safeguards agreement with the International Atomic Energy Agency, concluded pursuant to the Treaty on the Non-Proliferation of Nuclear Weapons of 1 July 1968, as established by the resolution of the Board of Governors of the IAEA of 18 July 1991 (GOV/2532),* constitutes a breach of its international obligations,

Determine to ensure full compliance with resolution 687 (1991) and in particular its section C,

Acting under Chapter VII of the Charter,

1. **Condemn** Iraq's serious violation of a number of its obligations under section C of resolution 687 (1991) and of its undertakings to cooperate with the Special Commission and the IAEA, which constitutes a material breach of the relevant provisions of resolution 687 which established a cease-fire and provided the conditions essential to the restoration of peace and security in the region;
2. **Further condemns** non-compliance by the Government of Iraq with its obligations under its safeguards agreement with the International Atomic Energy Agency, as established by the resolution of the Board of Governors of 18 July, which constitutes a violation of its commitments as a party to the Treaty on the Non-Proliferation of Nuclear Weapons of 1 July 1968;
3. **Demand** that Iraq
 - (i) provide full, final and complete disclosure, as required by resolution 687 (1991), of all aspects of its programmes to develop weapons of mass destruction and ballistic missiles with a range greater than 150 km, and of all holdings of such weapons, their components and production facilities and locations, as well as all other nuclear programmes, including any which it claims are for purposes not related to nuclear-weapons-usable material, without further delay;

* A/45/1037; S/22812, appendix.

- (ii) allow the Special Commission, the IAEA and their Inspection Teams immediate, unconditional and unrestricted access to any and all areas, facilities, equipment, records and means of transportation which they wish to inspect;
 - (iii) cease immediately any attempt to conceal, or any movement or destruction of any material or equipment relating to its nuclear, chemical or biological weapons or ballistic missile programmes, or material or equipment relating to its other nuclear activities without notification to and prior consent of the Special Commission;
 - (iv) make available immediately to the Special Commission, the IAEA and their Inspection Teams any items to which they were previously denied access;
 - (v) allow the Special Commission, the IAEA and their Inspection Teams to conduct both fixed wing and helicopter flights throughout Iraq for all relevant purposes including inspection, surveillance, aerial surveys, transportation and logistics without interference of any kind and upon such terms and conditions as may be determined by the Special Commission, and to make full use of their own aircraft and such airfields in Iraq as they may determine are most appropriate for the work of the Commission;
 - (vi) halt all nuclear activities of any kind, except for use of isotopes for medical, agricultural or industrial purposes until the Security Council determines that Iraq is in full compliance with this resolution and paragraphs 12 and 13 of resolution 687 (1991), and the IAEA determines that Iraq is in full compliance with its safeguards agreement with that Agency;
 - (vii) ensure the complete implementation of the privileges, immunities and facilities of the representatives of the Special Commission and the IAEA in accordance with its previous undertakings and their complete safety and freedom of movement;
 - (viii) immediately provide or facilitate the provision of any transportation, medical or logistical support requested by the Special Commission, the IAEA and their Inspection Teams;
 - (ix) respond fully, completely and promptly to any questions or requests from the Special Commission, the IAEA and their Inspection Teams;
4. Determines that Iraq retains no ownership interest in items to be destroyed, removed or rendered harmless pursuant to paragraph 12 of resolution 687 (1991);
 5. Requires that the Government of Iraq forthwith comply fully and without delay with all its international obligations, including those set out in the present resolution, in resolution 687 (1991), in the Treaty on the Non-Proliferation of Nuclear Weapons of 1 July 1968 and its safeguards agreement with the IAEA;
 6. Decides to remain seized of this matter.

APPENDIX E

United Nations Security Council Resolution 715 (1991)

The Security Council,

Recalling its resolutions 687 (1991) of 3 April 1991 and 707 (1991) of 15 August 1991, and its other resolutions on this matter,

Recalling in particular that under resolution 687 (1991) the Secretary-General and the Director General of the International Atomic Energy Agency were requested to develop plans for future ongoing monitoring and verification, and to submit them to the Security Council for approval,

Taking note of the report and note of the Secretary-General,* transmitting the plans submitted by the Secretary-General and the Director General of the International Atomic Energy Agency,

Acting under Chapter VII of the Charter of the United Nations,

1. **Approves**, in accordance with the provisions of resolutions 687 (1991), 707 (1991) and the present resolution, the plans submitted by the Secretary-General and the Director General of the International Atomic Energy Agency;*
2. **Decides** that the Special Commission shall carry out the plan submitted by the Secretary-General,† as well as continuing to discharge its other responsibilities under resolutions 687 (1991), 699 (1991) and 707 (1991) and performing such other functions as are conferred upon it under the present resolution;
3. **Requests** the Director General of the International Atomic Energy Agency to carry out, with the assistance and cooperation of the Special Commission, the plan submitted by him‡ and to continue to discharge his other responsibilities under resolutions 687 (1991), 699 (1991) and 707 (1991);
4. **Decides** that the Special Commission, in the exercise of its responsibilities as a subsidiary organ of the Security Council, shall:
 - (a) Continue to have the responsibility for designating additional locations for inspection and overflights;

* S/22871/Rev.1 and S/22872/Rev.1 and Corr.1

† S/22871/Rev.1

‡ S/22872/Rev.1 and Corr.1.

- (b) Continue to render assistance and cooperation to the Director General of the International Atomic Energy Agency, by providing him by mutual agreement with the necessary special expertise and logistical, informational and other operational support for the carrying out of the plan submitted by him;
 - (c) Perform such other functions, in cooperation in the nuclear field with the Director General of the International Atomic Energy Agency, as may be necessary to coordinate activities under the plans approved by the present resolution, including making use of commonly available services and information to the fullest extent possible, in order to achieve maximum efficiency and optimum use of resources;
5. Demands that Iraq meet unconditionally all its obligations under the plans approved by the present resolution and cooperate fully with the Special commission and the Director General of the International Atomic Energy Agency in carrying out the plans;
 6. Decides to encourage the maximum assistance, in cash and in kind, from all Member States to support the Special Commission and the Director General of the International Atomic Energy Agency in carrying out their activities under the plans approved by the present resolution, without prejudice to Iraq's liability for the full costs of such activities;
 7. Requests the Committee established under resolution 661 (1990), the Special Commission and the Director General of the International Atomic Energy Agency to develop in cooperation a mechanism for monitoring any future sales or supplies by other countries to Iraq of items relevant to the implementation of section C of resolution 687 (1991) and other relevant resolutions, including the present resolution and the plans approved hereunder;
 8. Requests the Secretary-General and the Director General of the International Atomic Energy Agency to submit to the Security Council reports on the implementation of the plans approved by the present resolution, when requested by the Security Council and in any event at least every six month after the adoption of this resolution;
 9. Decides to remain seized of the matter.

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