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Missiles and Weapons of Mass Destruction (WMDs) in Iraq and Iran:

Current Developments and Potential for Future Surprises

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Articles & Testimony

The following analysis was prepared for the Commission to Assess the Ballistic Missile Threat to the United States (The Rumsfeld Commission), March 23, 1998.

This paper will attempt to answer the following questions: 1) What are the current missile capabilities of Iraq and Iran? 2) What kind of WMD payloads can these countries put atop their missiles? 3) What considerations should analysts bear in mind in assessing the future direction of missile and WMD programs in these two countries?

IRAQ1

Ballistic Missiles

Before the 1991 Gulf War, the backbone of Iraq's missile force consisted of the al-Husayn missile, which was an extended-range variant of the Soviet Scud-B. Originally, the al-Husayn was built by cannibalizing Scud-Bs, using three Scud-Bs to create two al-Husayns. Subsequently, Iraq was able to achieve a 1:1 conversion ratio by producing airframe and fuel-tank components locally. By the time of the 1991 Gulf War, Iraq was able to produce most of the components for the al- Husayn locally, including warheads, airframes, and motors. (Iraq is not believed to have been able to produce the guidance system and turbopumps for the motors, and Iraq claims that of the 80 or so motors it produced, none performed to standard.) Iraq was also working on a number of medium- and intermediate-range missiles which never got beyond the design or initial development stages.2

Iraq may retain a small force of operational missiles -- probably locally produced versions of the al-Husayn -- equipped with chemical or biological warheads and mounted on mobile launchers. In addition, Iraq has conducted computer design studies of missiles with proscribed ranges since the 1991 Gulf War (including missiles with ranges of several thousand kilometers), and it has continued efforts to procure components for such missiles -- including gyroscopes obtained in 1995 from scrapped Russian intermediate-range missiles. Because Iraq is permitted to produce missiles with a range of 150 km or less, it retains the infrastructure, talent, and know-how needed to reconstitute its missile program rapidly, and it has been working on several systems -- such as the Ababil (which uses an SA-2 rocket motor) and the Sumud (a miniature Scud-B) in order to preserve the skills of design and production personnel. Were inspections and monitoring to cease, Iraq could produce a missile of proscribed range perhaps within a year, by clustering or stacking missiles currently in its inventory, or by resuming production of the al-Husayn missile.3

WMD Payloads

Despite seven years of inspections, Iraq retains a significant residual CBW arsenal, and is probably is quietly continuing with its nuclear effort.

Iraq's Pre-1991 Missile Force

MISSILE	RANGE (KM)	COMMENTS
Fao	**100-200**	**An extended range HY-1 Silkworm antiship missile for use against ground targets**
Fahd	**300**	**SA-2 modified for use against ground targets**
Scud-B	**300**	**Standard Soviet 8k-14 Scud-B**
Al-Husayn	**650**	**Modified Scud-B, fitted with HE and CBW warheads**
Al-Husayn "short"	**650**	**Al-Husayn modified in attempt to solve flight instability problems**
Al-Husayn "nuclear"	**630**	**Al-Husayn modified to carry nuclear weapon to be produced under August 1990 "crash program"**
Al-Hijara	**650**	**Al-Husayn fitted with concrete-filled "kinetic penetrator" warhead**
Al-Abbas	**950**	**Extend range al-Husayn**
Al-Abid	**n/a**	**Space launch vehicle test-launched December 1989**
Tammuz	**unknown**	**Al-Husayn with SA-2 second stage; mock-up built**
Badr 2000	**750+**	**Solid-fuel missile being developed jointly with Argentina and Egypt. Development only partially completed. Intended as Iraq's primary nuclear delivery system.**

Chemical Weapons

Iraq is believed to still possess a small stockpile of lethal agents, munitions, precursor chemicals, and production equipment that provide it with the ability to inflict massive casualties on an unprotected civilian population, though it probably does not have sufficient quantities of chemical munitions for effective battlefield use. This residual inventory probably includes stocks of blister and nerve agents, possibly including quantities of "VX salt" -- a form of the highly lethal nerve agent that can be stored on a long-term basis. The U.S. government believes that if inspections and monitoring were to cease, Iraq could resume production of mustard agent in weeks, sarin within months, and VX in 2-3 years.iv

Some 45-75 al-Husayn warheads remain unaccounted for (Iraq claims to have unilaterally destroyed them but offers no proof). Iraq's first generation CW warhead consisted of converted Scud-B warheads, and was a unitary design that relied on a burster charge to aerosolize and disseminate the agent. Because these warheads retained the contact fuzing of the original warhead, the burster charge would have detonated only upon impact, disseminating the agent over a very limited area (perhaps several tens of meters from the point of impact). A nerve agent payload, however, could nonetheless create a downwind hazard extending hundreds of meters or more from the impact point, depending on weather conditions and building patterns. If Iraq has succeeded since 1991 in acquiring barometric or radar proximity fuzes for its missile warheads, it might be able to make a more efficient warhead that would disseminate its CW payload over the heads of the target population (i.e. prior to impact), dramatically increasing the size of the lethal downwind footprint, and increasing the number of potential casualties per missile strike.5

Biological Weapons

Iraq probably retains agent seed stocks, growth media, production equipment, and munitions, and almost certainly has sufficient quantities of biological agent on hand to cause massive casualties among civilians, though it may not yet have perfected the means for effectively disseminating biological warfare agents. Both UNSCOM and the U.S. government believe that if inspection and monitoring were to cease, Iraq could resume production of biological agents within a matter of days. Some UN inspectors, however, believe that Iraq may currently possess a clandestine biological warfare agent production capability, which means that they could be producing biological warfare agents even now.6

Iraq almost certainly retains a residual biological warfare capability, since some agents (such as anthrax in its spore form) can be stored and remain viable for decades, although it is unclear whether Iraq has developed an effective warhead for missile delivery. Iraq is believed to have used basically the same modified Scud-B warheads used in its CW program as its first generation BW delivery system. As such, these warheads would have probably been even less effective at disseminating BW agent than CW agent, since the explosive burster charge would have killed many of the pathogens during dissemination. And if Iraq was producing BW agent in liquid form only (as it claims), the percentage of agent aerosolized by the burster charge in the optimal size for inhalation would have been minuscule. Even in the worst case, perhaps several tens of people would have been affected. Perhaps more people would have been killed by the impact of the warhead and missile airframe.

This assessment would change, however, if Iraq succeeded since 1991 in acquiring and fitting barometric or radar proximity fuses to its surviving al-Husayn missile warheads. This would result in a warhead that would disseminate its BW payload overhead -- before impacting with the ground -- allowing for more efficient dissemination of the agent. While it may be difficult for Iraq to test such an arrangement under the nose of UN weapons inspectors, it is not impossible: they may have done so by testing such a fusing arrangement on one of its missiles of permitted (less than 150km) range. Likewise, Iraq might be working on designs for a more efficient and effective second generation BW warhead employing submunitions to more uniformly disseminate the agent over a broader area. It would be almost impossible for UN inspectors to detect such activities if they were restricted to paper and computer design studies and lab work.

Finally, if Iraq were to have the capability to produce BW agent in dried form and to mill the dried agent to the optimal size for dissemination and inhalation by human subjects, it would be able to introduce dramatic improvements into its warhead design. Iraq is believed to retain the equipment required to do so, though it is unclear whether it has mastered the technique. As stated above, Iraq's first generation BW weapons used agent in liquid form. When disseminated by a burster charge, a large percentage of pathogen are killed by the explosion, and much of the resulting aerosol is not the right size for inhalation. Only about 1% of a liquid agent load is effectively disseminated when dispersed by a burster charge. However, in the case of dried agent that is already milled to the proper size before loading in the warhead, a much higher percentage of the agent payload can be effectively disseminated (even if the dissemination pattern provided by a unity warhead is relatively inefficient). And if Iraq could master the design of bomblets for a submunition warhead that would uniformly disseminate the agent over a wide area, even greater efficiencies could be realized. It is not clear whether Iraq has made any progress in developing such a warhead since 1991, although there is reason to believe that it was working on such a design before the Gulf War.7

Nuclear Weapons

Iraq possesses a workable bomb design, bomb components produced before the Gulf War (it claims to have destroyed these but has not provided credible evidence), and its cadre of experienced scientists and technicians -- who are being kept together and are probably able to do paper and computer studies and simulations as well as weapons design work with little risk of detection.

Since the Gulf War, Iraq is suspected of having conducted clandestine theoretical research relating to bottlenecks in its pre-1991 program, which would make it easier to resurrect its program if inspections and monitoring were to cease. The greatest concern, however, remains the possibility that were Iraq to acquire fissile material from abroad, it could probably produce an operational nuclear device -- perhaps within a year -- even with inspections and monitoring in place. It is not clear, however, whether such a device would be small enough and reliable enough to be delivered by missile. In such a case, vehicle, vessel, or aircraft delivery options are possible.8

Iraq also retains the capability to produce radiological weapons. Iraq researched radiological weapons in the mid-late 1980s and field tested one or two different types of bombs filled with a radiological payload. United Nations Security Council resolutions allow Iraq to possess radioactive isotopes for medical, agricultural, and industrial purposes, which are the raw materials needed to produce radiological weapons. These, however, are probably more useful as terror weapons than weapons of mass destruction.9

IRAN10

Ballistic Missiles

The backbone of Iran's strategic missile force consists of 200-300 North Korean Scud-B and -C missiles, with ranges of 320 km and 500 km, respectively. These missiles are armed with conventional and perhaps chemical warheads, are mounted on ten to fifteen mobile launchers, and can reach major population centers in Iraq, Saudi Arabia, and the smaller Arab Gulf states. In addition, Iran funded the development of North Korea's Nodong-1 missile which, with a range of 1,300 km, is capable of reaching Israel from Iran. The program, however, has reportedly been plagued by technical and financial problems; the Nodong-1 has been tested only once (in May 1993) and only a small number of systems (ten mobile launchers with missiles) have been produced by North Korea and fielded with its own forces. Though Iran is not believed to have taken delivery of finished Nodong-1 missiles, it is believed to have received much of the technology incorporated in this missile as compensation for its financial support.11

Iran also signed a contract in 1989 for some 200 Chinese CSS-8 missiles, and at least several score have been delivered. These are SA-2 (HQ-2) surface-to-air missiles which have been modified for use against ground targets. Though possessing limited range, payload, and accuracy, they would be important in the event of a future war with Iraq because of their ability to hit major Iraqi population centers near the border with Iran and because they offer Iran a cheap and effective way to dramatically augment its offensive punch.12

Iran has been trying since the mid-1980s to acquire a missile production capability, in order to end its reliance on external sources of supply. This effort, however, has been plagued by various bottlenecks, including a shortage of skilled personnel, special materials, technological expertise, and adequate financing. As a result, until recently, Iran had little success in creating an indigenous production capability thus far.13

This may be changing, however, thanks to aid provided by Russia, China, and North Korea in the past 2-3 years. This assistance includes equipment, machinery, components (including guidance systems), and special materials required to produce missiles. At present, Iran assembles Scud-C missiles acquired in kit form from North Korea and it is reportedly building two hybrid liquid-fuel systems with substantial help from Russia: the Shehab-3 -- based on the North Korean Nodong-1 is expected to have a range of 1,300km, and the Shehab-4 -- based on the Soviet SS-4 is expected to have a range of 2,000km. In 1997, Iran conducted 6-8 static ground tests of the motor for the Shehab-3, indicating that work has gone beyond the design stage. According to leaked intelligence estimates, the Shehab-3 is likely to make its first test flight within 1-2 years, and the Shehab-4 its maiden flight within about 3-4 years.14 Iran is also believed to have a parallel short-range solid-fuel missile (with a range of 150km) that it is undertaking with Chinese help.15

Iran's Rocket and Missile Forces

	RANGE (KM)	PAYLOAD	SOURCE	COMMENTS
ROCKETS:				

Shahin-1/2	**20**	**HE/CBW(?)**	**Local**	**--**
Oghab	**45**	**HE/CBW(?)**	**Local**	**--**
Fajr-3/5	**45**	**HE/CBW(?)**	**Local**	**--**
Naze'at-4/6/10	**90**	**HE/CBW(?)**	**Local**	**--**
Zelzal-2	**100**	**HE/CBW(?)**	**Local**	**--**
MISSILES:				
CSS-8	**150**	**HE/CBW(?)**	**China**	**--**
Scud-B	**320**	**HE/CBW(?)**	**N. Korea**	**--**
Scud-C	**500-600**	**HE/CBW(?)**	**N. Korea**	**--**
Shehab-3	**1,300**	**CBW(?)**	**Local (with foreign help)**	**Nodong-1 derivative?**
Shehab-4	**2,000**	**CBW(?)**	**Local (with foreign help)**	**SS-4 derivative?**

Iran also produces a range of artillery rocket systems, including the Shahin, Oghab, Fajr, Naze'at, and Zelzal. Although these rocket systems were developed primarily for a battlefield support role, Iran used the Oghab in a strategic role during the February-April 1988 "War of the Cities," to bombard Iraqi cities and towns, as well as military targets along the border. In a future war with Iraq, they would almost certainly be used in such a fashion again, and could be used to deliver chemical strikes if necessary.

Iran is also reportedly working on a cruise missile to deliver conventional and nonconventional payloads. A first-generation Iranian cruise missile would probably be based on missiles currently fielded by Iran, such as the Chinese HY-1 Silkworm or C-802 antiship missiles, which would simplify and expedite initial production efforts. Indeed, there are reports that Iran is developing an extended-range version of the HY-1.16

Because of its isolation and weakness, the Islamic Republic of Iran has shown a preference for using covert, indirect methods -- such as the use of terrorist proxies -- as a means of achieving key political or military objectives. This has enabled Iran to challenge more powerful adversaries while minimizing the risk of retaliation. Because of its success in employing such methods in the past, Iran is more likely than other states to rely on covert delivery means to deliver chemical and biological agents (saboteurs armed with aerosol dispensers, or specially trained teams operating vehicles, aircraft, or small boats fitted with spray tanks) especially when dealing with an adversary capable of retaliating in kind, or escalating with nuclear weapons.

Chemical Weapons

Iran possesses one of the largest chemical warfare programs in the developing world. It can produce several hundred tons of chemical agent a year and may have produced several thousand tons of agent to date, including blister (sulfur mustard), choking (phosgene), blood (cyanidal), and possibly nerve (sarin) agents.17 Given that Syria first received Soviet binary-type Scud missile warheads for its own stockpile of Scud-Bs in 1979,18 and that Syria and Iran are believed to have a rather close relationship in the military R&D domain, it would seem prudent to assume that Iran gained access to these warheads for reverse engineering purposes, or that it emulated the Iraqi approach in modifying conventional Scud warheads in order to produce a first generation chemical warhead for its own inventory of Scud-B and -C missiles.

In January 1993, Iran signed the Chemical Weapons Convention (CWC), which it ratified in June 1997, and which obligates it to destroy its stocks of chemical weapons within ten years of ratification. Despite these steps toward apparent compliance with the CWC, it is hard to believe that Iran would give up a potentially important tactical force multiplier and the core component of its strategic deterrent while Iraq may retain residual chemical and biological warfare capabilities. One explanation is that Iran has ratified the treaty with the intention of hiding stocks of chemical weapons for future contingencies. If so, it might give up its stockpiles of older, less effective agents, while covertly retaining its stocks of more lethal agents. Alternatively, it might intend to give up its agent stockpile while retaining an emergency surge capability for production during a crisis. Either way, Iran may provide an early test of the efficacy of the CWC.

Biological Weapons Iran may have produced small quantities of biological agent and perhaps a small number of weapons. It probably is researching such standard agents as anthrax and botulin toxin (two agents also produced by Iraq) and it has shown interest in acquiring materials that could be used to produce various other toxins (specifically, mycotoxins and ricin). Iran can probably deploy biological weapons and disseminate them via either terrorists or spray tanks mounted on vehicles, aircraft, or boats, although more advanced means of dissemination -- by unmanned aircraft or missiles, for instance -- may currently be beyond its means.19

Nuclear Weapons Iran's known nuclear technology base is at present rather rudimentary, although it is building an extensive civilian nuclear infrastructure that could serve as a stepping stone to a weapons program. In particular, its efforts to acquire research reactors, nuclear power plants, and nuclear fuel cycle related facilities, its apparent investigation of various enrichment techniques (gas centrifuge enrichment in particular), and reports of Iranian efforts to obtain fissile material in the former Soviet Union have raised questions about Iran's intentions.

Because Iran's nuclear program is believed to be in the early stages, at this time there are few unambiguous indicators of nuclear intent. However, Iran's procurement activities during the past decade are not entirely consistent with a peaceful nuclear program. Iran's strategy is probably to build up its civilian nuclear infrastructure while avoiding actions that would clearly violate its NPT commitments, using its new contacts in Russia and China to gain experience, expertise, and dual-use technology that could assist a parallel clandestine military program sometime down the road. Most public estimates of the time Iran will need to attain a nuclear capability range between seven and fifteen years, although Tehran could probably acquire a nuclear capability sooner if it were to receive fissile material and extensive help from abroad. Because of the uncertainties involved, it is impossible to predict how long it could take Iran to develop nuclear weapons.There is no doubt though, that the acquisition of civilian research reactors, nuclear power plants, and nuclear technology from Russia and China will ultimately aid this effort. Without such outside help, Iran will probably face formidable obstacles to realizing its nuclear ambitions.20

Outlook

In the coming years, it will be very difficult to assess the scope and progress of the missile and WMD programs of Iraq and Iran, due to target country deception and denial efforts, because progress in each of these programs will depend on the interplay of several variables whose interaction are difficult to predict or assess, and because these programs may benefit from help from various foreign actors (individuals, companies, or governments) whose identity and motives may not always be clear.

In Iraq, the international community will be faced with the problem of detecting covert design and development work and field tests of warheads and other components destined for missiles of proscribed range, masquerading as tests of missiles of permitted range. It is likely that Iraq will be able to conduct significant research, development, and testing that will not be detected by UN inspectors or observed by foreign intelligence agencies. As a result, Iraq might be able to make unexpected progress on its missile and WMD programs despite sanctions and inspections, even if it is unable to engage in the full range of development and testing activities that are considered part of the R&D cycle elsewhere. This could include progress toward more efficient chemical and biological missile warhead designs, innovative ways to extend the range of permitted systems beyond 150km by stacking or clustering, the elimination of bottlenecks in the al-Husayn program to enable the resumption of production once sanctions are lifted, and work on medium- and intermediate-range missile designs.

In the case of Iran, the problem is somewhat different. There, the problem is determining the scope and depth of foreign help to Iran's missile (and WMD) programs, including the transfer of know-how and technology. While technology transfers can be documented (even if this is easier said than done), getting a handle on the know-how that has been transferred (both officially and unofficially) may often be impossible. And while technology transfers are important, the transfer of know-how is probably the more important factor in the long-term. This assistance might enable Iran to develop chemical and biological warheads for its missiles (if it does not possess these already), and enable Iran to skip the production of short-range liquid-fuel missiles and move directly to medium- and intermediate-range liquid-fuel missiles -- perhaps equipped with rudimentary penetration aids (simple decoys, a modest maneuver capability, or chaff and low power electronic countermeasures).21 In addition, future progress will depend on whether Iran's military industries will be able to overcome the lack of managerial and systems integration skills that have been an obstacle to progress in the missile and WMD field in the past.

APPENDIX

Some Thoughts on Evaluating Future Developments in Missile and WMD Proliferation

The following are a number of observations drawn from my own experience, about how to think about missile and WMD proliferation in the Middle East. I hope that these insights might be of use to others thinking about the future direction of missile and WMD proliferation in the region, and elsewhere.

Foreign Help the Rule, Not the Exception

Estimates concerning the future development of missile and WMD programs often do not take into account the possibility of foreign assistance to these programs. But a review of the historical record shows that foreign assistance to missile and WMD programs is more the rule, than the exception. In particular, attention must be paid to unexpected linkages and connections (Argentina or Brazil and Iraq? South Africa or Pakistan and Iran?). In addition, there is a need for comparative studies to provide a better understanding of how foreign help (the transfer of know-how, technology, or both) have influenced missile and WMD programs in the past.

Foreign Assistance to Various Missile and WMD Programs

ORIGIN OF AID	RECIPIENT	PROGRAM	WHEN	COMMENTS
Germany	**U.S../USSR**	**Missiles**	**After WWII**	**Spoils of War**
U.S.	**USSR**	**Nuclear**	**After WWII**	**Espionage**
U.S.	**UK/France**	**Nuclear**	**1950s**	**Official Assistance**
France	**Israel**	**Nuclear**	**1950s**	**Official Assistance**
USSR	**China**	**Nuclear**	**late 1950s**	**Official Assistance**
France	**Israel**	**Missiles**	**1960s**	**Official Assistance**
China	**Pakistan**	**Nuclear**	**1970/80s**	**Official Assistance**
USSR	**Syria**	**CW Warheads**	**1970/80s**	**Official Assistance**
Germany	**Arg/Eg/Iraq**	**Missiles**	**1980s**	**Private Businessmen (unauthorized)**
Germany	**Iraq**	**Nuclear**	**1980s**	**Private Businessmen (unauthorized)**
China	**Pakistan**	**Missiles**	**early 1990s**	**Official Assistance**
Russia	**Syria**	**CW**	**early 1990s**	**Government officials (unauthorized?)**
China	**Syria**	**Missiles**	**early 1990s**	**Official assistance**
Russia	**Iran**	**Missiles**	**mid-1990s**	**Official assistance (probable)**
China	**Iran**	**Missiles**	**mid-1990s**	**Official assistance**
China	**Iran**	**CW**	**1990s**	**Private businessmen (unauthorized?)**
Russia	**Iraq**	**Missiles**	**mid-1990s**	**Government officials (unauthorized?)**

They Won't Do it "Our Way"

Experience has shown that American experience in weapons development and employment often has limited utility in providing templates that could be used to gauge the progress of foreign missile and WMD programs, because potential proliferators are likely to take shortcuts or embrace approaches that most Americans would not countenance. Moreover, many will settle for standards of performance that American's would reject. For many proliferators, "good enough" is indeed, "good enough." They don't need "state of the art" technology or capabilities to achieve their objectives.

Not all 3rd World Programs are the Same

Similarly, insights drawn from studying the missile or WMD program of one 3d world country may not necessarily be relevant to that of another, because not all 3d world weapons programs are the same. Syria's missile and WMD efforts are tightly focused -- consisting primarily of two types of delivery systems (bombs and Scud-B/C missiles) and two types of CW agent (sarin and VX), intended primarily for use as strategic weapons. By contrast, Iraq's programs reflected the grandiose ambitions of the country's leadership. Before the 1991 Gulf War, Iraq was working on two supergun and fifteen missile designs, at least four chemical and five biological agents, and a wide variety of delivery techniques that would allow for tactical and strategic use of chemical and biological agents. In addition, Iraq investigated nearly half a dozen enrichment techniques as part of its nuclear weapons program. In terms of complexity, the Iranian program falls somewhere between these two extremes. Moreover, idiosyncratic factors -- such as the character or predilections of the country's leadership or the background of foreign experts recruited to aid a program -- often have as much influence on such programs as do strategic considerations.

Expect to be Surprised

Experience has shown how difficult it is to accurately predict future developments in the realm of missile and WMD proliferation -- in large part because analysts often underestimate the capabilities of potential proliferators, who are likely to take shortcuts that would be consider unacceptable in more advanced countries, and because foreign assistance can often allow proliferators to leapfrog development milestones.

Not Field Tested? No Problem!

Foreign missile and WMD sometimes do not undergo the rigorous testing regimen that are considered a prerequisite for the fielding of weapons in the West (for instance, the Nodong-1 has been tested only once -- and never at its maximum range, and except for India and perhaps Israel, none of the threshold nuclear weapons states have tested their weapons). As a result, there are relatively few opportunities to observe and assess the actual capabilities of weapons developed by third world proliferators. This, however, does not undermine the utility of these systems in the eyes of possessor states and potential target states.

Assumed Capabilities, Not Actual Capabilities, Shape Perceptions

Because missiles or WMD are rarely tested until used in combat, it is the assumed capabilities of fielded weapons, not their actual capabilities, that are important in shaping the perceptions of publics and decisionmakers in potential target states. In the absence of solid data about the capabilities of such weapons, they will be assumed to be effective, even if such an assumption may not necessarily be warranted. For instance, during the Iraq crisis of early 1998, Israelis reacted with fear and panic to the prospect of new missile attacks, even though Iraq was believed to possess only a few missiles, and there were significant doubts as to whether the chemical or biological warheads that could be mounted on these missiles would even work. (In light of the uncertainties about Iraq's BW program, these concerns were probably not unjustified.) The failure of these weapons to measure up to US performance standards does not vitiate their potential political utility in a crisis or a war.

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NOTES

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4. USG, Iraqi Weapons of Mass Destruction Programs, pp. 5-7, 15.

5. Much of the information in this section is derived from discussions and interviews with UNSCOM weapons inspectors during the period 1992-1998.

6. USG, Iraqi Weapons of Mass Destruction Programs, pp. 4-5, 13; discussions and interviews with UNSCOM weapons inspectors, 1998.

7. Discussions and interviews with UNSCOM weapons inspectors, 1998.

8. Eisenstadt, Like a Phoenix from the Ashes?, pp. 26-30; Maurizio Zifferero, "IAEA Activities and Experience in Iraq Under the Relevant Resolutions of the United Nations Security Council," in IAEA, International Nuclear Safeguards 1994: Vision for the Future (Vienna, Austria: International Atomic Energy Agency, 1994), pp. 211-221; Steven Dolley, "Iraq and the Bomb: The Nuclear Threat Continues" (Washington, D.C.: Nuclear Control Institute, February 19, 1998).

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13. Russian Foreign Intelligence Service (FIS), A New Challenge After the Cold War: Proliferation of Weapons of Mass Destruction (Moscow: FIS, 1993), in JPRS-TND, March 5, 1993, p. 29.

14. Los Angeles Times, February 12, 1997, pp. A1, A6; Washington Times, September 10, 1997, p. A1; Washington Post, December 31, 1997, p. A1; Washington Post, January 18, 1998, p. A9.

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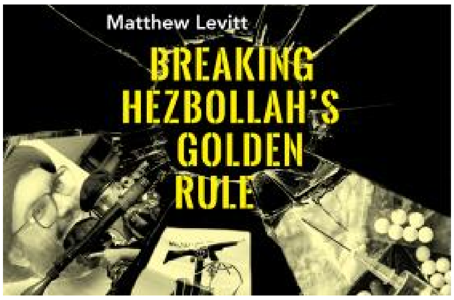

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