

Iraq's Asymmetric Threat to the United States and U.S. Allies

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Iraq's Asymmetric Threat to the United States and U.S. Allies

Iraq poses an extremely serious threat to the United States and to U.S. allies not only because of its continued possession of weapons of mass destruction (WMD), but also the increased likelihood that it will use such weapons in any future military conflict. This study examines Iraqi WMD capabilities as well as the Iraqi leadership's values and perceptions that will influence potential use of those weapons. Additionally, the possible impact of Iraq's WMD capabilities on U.S. behavior is addressed.

A Review of Iraqi Weapons of Mass Destruction (WMD)

Compared to openly available information about WMD capabilities in Syria, Egypt, and some other nations of the Middle East, a great deal is publicly known about Iraq's weapons programs. This is due in part to the fact that Iraq has used chemical, and perhaps biological, weapons; it has also fired missiles that are WMD-capable. More importantly, however, the wealth of data on Iraqi WMD efforts has resulted from the extensive inspections carried out under the auspices of the United Nations Special Commission on Iraq (UNSCOM) and the International Atomic Energy Agency (IAEA) from the end of the 1990-91 Gulf War until Iraq ended the inspections in December, 1998. This review of Iraqi WMD programs is drawn largely from UN documents, and will address chemical, biological, nuclear, and missile capabilities as separate programs.

Despite the many highly intrusive inspections conducted by the IAEA and UNSCOM from 1991 through 1998, the full breadth of Iraq's WMD capabilities remains unknown. Extensive concealment and deception efforts by the Iraqi government have been highly effective. Iraq used three basic techniques in an attempt to prevent the discovery and destruction by UNSCOM and the IAEA of its WMD and missile programs:

- camouflage, concealment, and deception (e.g., hiding equipment by burying it or moving it around on trucks or by rail, double-bookkeeping, changing the external appearance of structures to keep from revealing their true functions);
- actions collectively termed "unilateral destruction," by which Iraq purported to have secretly, and in contravention of UN Resolution 687 (1991), destroyed weapons and related materials; and,
- repeated denial of the existence of relevant documents on proscribed activities, with the exception of those Iraq unilaterally chose to provide.¹

The unknowns about Iraq's WMD and delivery capabilities have been greatly compounded since 1998. In early 1998, Iraq had already begun to seriously limit the abilities of the inspection teams to do their job and the situation worsened following allegations in June 1998 that Iraq was seeking to conceal the extent of its VX nerve agent program (more below). Iraq set restrictions that hampered ready transportation of inspectors and forbade entry into certain sites. Then, on August 5, 1998, Iraq banned UNSCOM and IAEA weapons inspections. On October 31, 1998, Iraq also banned monitoring activities. Several diplomatic attempts to restart the inspections process failed. The United States and United Kingdom then conducted air strikes on Iraq from December 16-19, 1998—a campaign known as Desert Fox. The

objective of Desert Fox, according to President Clinton, was to degrade Saddam's capacity to develop and deliver weapons of mass destruction and to degrade his ability to threaten his neighbors.

The effects of Desert Fox on Iraq's WMD capabilities were not significant. Then-Secretary of Defense William Cohen stated that Iraq's missile program had been set back a year. There is no way of knowing whether that assessment is accurate, but assuming that it is, it would seem a very limited accomplishment. As for other aspects of the Iraqi WMD program, the damage was even less than that of the missile infrastructure. Of 11 WMD industry and production facilities struck, only one was destroyed, 1 severely damaged, 5 moderately damaged, and 4 lightly damaged.²

Overall, Iraq probably benefited from Desert Fox. It won sympathy from many nations—including Russia and China, who both condemned the operation—and from the UN Secretary General. Any international consensus that might have remained for forcing Iraq to comply with UN inspections was dissipated by the bombings. Thus, when Iraq continued to thwart inspections efforts in the aftermath of Desert Fox, there were no significant political or military ramifications. In fact, Iraq was emboldened. It subsequently disabled automated video monitoring system installed by the UN at known and suspect WMD facilities and defiantly declared that neither inspections nor monitoring would ever be allowed again.

Iraq has now had almost three years without intrusive inspections or monitoring. The WMD programs have been reconstituted and there has been significant rebuilding of key facilities. Foreign expertise has been sought, including some from scientists and engineers acting as individuals. There is no question that the capabilities of Iraq have progressed beyond those described below.

Chemical Weapons

Iraq continues to place great value on maintenance of a chemical weapons (CW) stockpile as well as its abilities to produce more such weapons. This is evidenced not only by its extensive efforts to hide existing chemical agents and weaponry during UNSCOM inspections, but also to retain and expand its CW production infrastructure after those inspections ended in 1998.

Unless Iraq volunteers the information—something it has refused to do since 1991—there is no way to know with certainty how many types of chemical agent Iraq actually has produced and in what quantities. Nor is it possible to ascertain how many and what types of delivery weapons, loaded with chemical agent, are in Iraq's current inventory. These uncertainties stem from a number of factors: incomplete, unverified information on how much of Iraq's chemical inventory was expended during the Iran-Iraq Gulf War (1980-88); incomplete or inaccurate declarations by Iraq on the quantities of chemical precursors, agents, and weapons were produced overall; lack of evidence to support Iraqi contentions that some CW were discarded or destroyed; and, paucity of information on what Iraq has done to resume CW production since UN-sponsored inspections ended in 1998.

Iraq is known to have produced at least six chemical agents (Table 1). Among these are extremely high-purity mustard (94-97%), which has a long shelf-life, and the very deadly nerve agent VX. It is also known that Iraq filled artillery shells, bombs, and missiles with chemical agents. Although many of these agents and weapons were destroyed by UNSCOM, and perhaps some were destroyed unilaterally as Iraq claims, it is probable that many remain in Iraq's arsenal.

The difficulty in determining the composition and extent of Iraq's CW holdings is illustrated by the examples of VX and of Agent 15. Agent 15 is one of a large group of chemicals called glycollates, the best-known of which is an agent referred to as BZ. These compounds cause physiological effects that interfere with nerve transmissions, causing effects that could include: dilated pupils, weakness, dizziness, disorientation, hallucinations, loss of time sense, and loss of coordination.

Iraq did not disclose its work on Agent 15, despite the requirement to do so under UN Security Council Resolution 687. An Iraqi document was disclosed to British Intelligence in August 1995 that stated that Iraq was conducting laboratory research on the agent. In 1997, intelligence was acquired that Iraq had possessed large stocks of Agent 15, a fact ultimately revealed by the UK Ministry of Defense in a report issued in early 1998.³

Table 1. Chemical Agents Produced by Iraq

Mustard	Sarin
GB	GF
Tabun (GA)	VX
Novichok (possible)	Agent 15 (probable)

Another significant issue is whether Iraq was able to produce in significant quantities, and weaponize, the deadly nerve agent, VX. There is certainty that Iraq imported at least 750 tons of precursor chemicals for VX and itself manufactured 55 tons or more. Iraq claimed that its program to manufacture VX failed because the VX it produced was low purity and unstable. However, UNSCOM reported to the UN Security Council its view that Iraq was able to produce VX, perhaps in substantial quantities. There is evidence that Iraq not only produced VX, but weaponized it. In April 1998, UNSCOM sampled some warheads that had been unilaterally destroyed by Iraq and analysis by a U.S. laboratory found traces of degradation products of VX. Iraq continues to deny that VX was produced in large quantities or that it was weaponized. Again, there is no means of resolving the issue absent complete Iraqi transparency.

Iraq also has attempted to keep UNSCOM from discovering and destroying its chemical production equipment. In 1991, prior to the arrival of the first UNSCOM inspection team, Iraq removed 197 pieces of chemical weapons production equipment from the principal manufacturing site, the Muthanna State Establishment. This equipment was repeatedly moved in shipping containers between several facilities in Iraq in the period 1991-96. Although the equipment was eventually discovered and destroyed, it is quite possible that other such equipment remains hidden.

The amounts of chemical agents and weaponry that may remain from production prior to 1991 are significant. There are indications that Iraq may continue to possess many thousands of chemical munitions:

- Iraq did not provide supporting documentation for over 16,000 chemical munitions it claimed were discarded or destroyed during the 1990-91 Gulf War.⁴
- 15,620 munitions were said by Iraq to have been destroyed unilaterally, but this cannot be verified.
- Iraq may have procured several thousand additional munitions and filled them with CW agents. (Some suppliers have failed to cooperate and provide data on what was delivered to Iraq.)
- Baghdad seized from UNSCOM inspectors an Air Force document discovered by UNSCOM that indicated that Iraq had not consumed as many CW munitions during the Iran-Iraq war in the 1980s as had been declared by Baghdad. This discrepancy indicates that Iraq may have hidden an additional 6,000 CW munitions.

The mustard agent left over from pre-1991 production is likely to remain effective. In 1996, Iraq claimed that 550 artillery shells were lost shortly after the 1990-91 Gulf War. (This can neither be proved nor disproved without Iraqi cooperation.) These 155 mm shells were filled with mustard agent. As a result of sampling, UNSCOM determined that the mustard agent produced by Iraq is of high purity. High purity is not only indicative of good manufacturing capabilities, it is imperative for long shelf-life. Thus, if the artillery shells were not destroyed as claimed, they are almost certainly still effective.

Following Desert Fox, Baghdad again instituted a reconstruction effort on those facilities destroyed by the U.S. bombing, including several critical missile production complexes and former dual-use CW production facilities.⁵ In addition, Iraq appears to be installing or repairing dual-use equipment at CW-related facilities. Conversion of these facilities for production of CW agents could be accomplished quickly, and they may already have been converted in the interim since inspections ended.

Another worrisome prospect is that Iraq may have received help from Russian experts to make CW agents several times more lethal than the deadly nerve agent VX. There have been reports that at least two Russian experts formerly associated with the Russian Novichok program have been sighted at an Iraqi chemical facility.⁶ Novichok agents are highly lethal, cannot be detected by western chemical warning devices⁷ and may be able to render western CW protective gear useless against attack.

Biological Weapons

As with its CW program, Iraq sought to hide the extent and nature of its capabilities from UNSCOM inspectors. Until July 1995, Iraq totally denied that it had any offensive biological weapons (BW) program. Then, after four-and-one-half years of claiming that it had conducted only "defensive research" on biological weapons, Iraq finally admitted that it had produced a half million liters of BW. This occurred only after a defector revealed information that led to the discovery of extensive documentation on the BW project.

The quantities of BW agent Iraq claimed it produced remains in serious doubt. The production capacity of Iraq's equipment as well as the amount of growth media it procured⁸ could have been used to produce much greater quantities. UNSCOM believes that Iraq produced substantially greater amounts—three to four times greater—than those declared.

In part, the confusion results from intentional Iraqi obfuscation. Iraq has made declarations regarding BW production and testing, only to withdraw or alter the declarations. For example, Iraq declared that it conducted a field trial with six R400 aerial bombs filled with botulinum toxin, simulant B, or aflatoxin. Subsequently, in its September 1997 declaration, it denied such a field trial.⁹

The confusion also stems from the very nature of biological weapons research, development, and production. These activities can be carried out in facilities that have no distinguishing features that would prompt further investigation by inspectors. Also, the activities, facilities, and equipment are dual-use; they could be used for development and production of vaccines, for example. Thus, Iraq was able to maintain some of its BW-capable facilities in working order by "converting" them to peaceful efforts to prevent and fight endemic diseases.

Table 2. A Description of Some Biological Warfare Agents Manufactured by Iraq¹⁰

Anthrax is a disease caused by a bacillus. Infection can result from inhalation, ingestion, or absorption through the skin. Symptoms occur 3-4 days after exposure and initially resemble a cold. As the disease progresses, the victim may suffer from vomiting and severe head and joint aches, and respiratory distress. Death may occur within 1-3 days. Antibiotic treatment may be effective, but usually only if administered prior to the onset of symptoms. The fatality rate among untreated victims is 80-90%.

Aflatoxin is a toxin produced by two types of fungi. Although the effects of inhalation or ingestion have not been fully determined, aflatoxin is known to be carcinogenic.

Botulinum toxin is produced by *Clostridium botulinum* bacteria. It causes nausea, diarrhea, convulsions, and possibly death due to respiratory arrest.

Clostridium perfringens causes gangrene in wounds, which in turn leads to death of muscle tissue. It can also enter the bloodstream and lead to death.

Wheat smut is a species of *Tilletia* fungus which can decimate wheat crops.

Although the quantities of agents produced remain in question, it is undisputed that Iraq manufactured multiple BW agents, including: *Bacillus anthracis* (anthrax), aflatoxin, *Clostridium botulinum* (spores and toxin), wheat smut, *Clostridium perfringens*, and a plant-derived toxin, ricin. Iraq also produced *Bacillus subtilis* and *Bacillus thurengensis* (*Bacillus anthracis* simulants).

Iraq developed multiple delivery systems for its BW agents:

- An aerosol generator. The generator was based on a modified helicopter-borne commercial chemical pesticide disseminator. This system was successfully tested in August, 1988.
- Al-Hussain missiles. Iraq claimed to have destroyed some Al-Hussains at a site inspected by UNSCOM. Inspectors were able to gather some physical evidence that the warheads indeed carried BW agent.¹¹
- R-400 and R400A bombs. UNSCOM has stated that it is not possible to determine how many bombs were filled with which particular agents.
- L29 trainer aircraft. These were converted into unmanned aerial vehicles for BW delivery (more below) and fitted with two underwing tanks capable of carrying 300 liters of BW or CW agent.¹²

It is unclear how many of each type of delivery system were actually armed with BW, so it is impossible to estimate how many may be in Iraq's arsenal. Another unresolved issue concerning weaponization is whether Iraq dried its BW agents. If so, it would enhance storage stability and the weapons would be effective for a much longer period.

In addition to the publicly known information on Iraqi BW and delivery systems, it is also possible that Iraq has researched and developed BW agents beyond those declared. It is known, for example, that Iraq was conducting research on genetic engineering, Tricothecene mycotoxins, and viruses. It may also

have been working on two additional bacteria, *Brucella mellitensis*, which causes Brucellosis, and the bacterium that causes the plague. The three viral agents it conducted research on were infectious hemorrhagic conjunctivitis virus (Enterovirus 70), rotavirus, and camel pox. No plausible explanation was given by Iraq for these activities. It is possible that Iraq has biological agents that it did not declare. Furthermore, it is reasonable to expect that, if Iraq did resume its BW program after inspections were ended, it has continued work on these or other agents.

One of the most worrisome prospects is that Iraq may have produced smallpox as a weapon. The strongest indicator that it might have done so is that Iraq manufactured smallpox vaccine. This vaccine would not be required, given that the disease has been eradicated, unless Iraq were producing or attempting to produce smallpox virus. Smallpox would be a highly effective weapon in an environment in which one's own personnel were immune, given that the disease is highly contagious and very deadly. Vaccination of U.S. civilians as well as military personnel ended decades ago.

Iraq probably kept up its BW research, development, and production despite efforts by the UN to destroy the program. Iraq has developed the capability to manufacture growth media. It has, as noted, maintained many facilities, much equipment, as well as its personnel by devoting them to related peaceful uses. It is also possible that weapons work continued in clandestine facilities despite the UNSCOM process. It would be virtually impossible to locate an underground BW production complex unless a human source were to leak serendipitously information regarding its existence and location. Alternatively, Iraq might have simply resumed the BW program after the UNSCOM inspections were ended. As a CIA official testified to the U.S. Congress in 1999, "We are concerned that Baghdad retains a small BW weapons capability and may resurrect a robust offensive BW program within weeks if there is no viable inspection regime in place."¹³ Given that there has been no inspections regime in place since late 1998, it would be prudent to assume that Iraq has resumed its biological weapons program. Iraq not only may have produced more types of agents and in greater quantities, but also may have a highly diverse, effective set of delivery systems for biological warfare.

Nuclear Weapons

Manufacturing a nuclear weapon requires a workable weapon design, non-nuclear materials and components such as high explosive and firing mechanisms, and fissile material. Iraq apparently has the first two.

How close Iraq was to completing a bomb is still open to debate. At the request of the IAEA, a group of nuclear weapon designers from the United States, Britain, France, and Russia met in April 1992 to assess the progress of Iraq's nuclear program prior to the Persian Gulf War, based on documents that had been obtained through subsequent inspections. These designers reportedly concluded that bottlenecks in the program could have delayed completion of a working bomb for at least 3 years, assuming Iraq had continued its multifaceted strategy and design approach. However, several experts familiar with the inspections believe that Iraq could also probably have produced a workable device in as little as 6 to 24 months, had they [sic] decided to seize foreign-supplied HEU from under safeguards and focus their efforts on a crash program to produce a device in the shortest possible amount of time.¹⁴

Additionally, an assessment by the U.S. Central Intelligence Agency stated, "A sufficient source of fissile material remains Iraq's most significant obstacle to being able to produce a nuclear weapon."

The two most likely ways in which Iraq could acquire fissile materials are indigenous production, or illicit purchase from another country such as Russia. If the route were indigenous, it is most likely that the

fissile material sought would be highly enriched uranium, although Iraq also has sought plutonium in the past.

In the late 1980s, early 1990s, Iraq followed two routes to enrich uranium—electromagnetic isotope separation and gas centrifuges. Both of these programs were, at the time of the 1990-91 Gulf War, unsuccessful. However, Iraq made tremendous strides, particularly with centrifuges. It acquired illegally a large number of highly classified gas centrifuge design, operation, and manufacturing documents from German centrifuge experts. Large portions of the centrifuge effort, including much of its equipment, materials, and personnel, were kept hidden by Iraq throughout the inspections process.

Ironically, Iraq's nuclear-related expertise was significantly enhanced by the inspections process. Iraqi experts had the opportunity to interact with U.S. and UK nuclear weapons experts, including gas centrifuge specialists. As more than one inspector told this author, the very nature of the questions asked by inspectors of the Iraqis would lead to expanded knowledge on the latter's part.

It is quite possible that Iraq will be able to enrich uranium on its own, or purchase it from abroad. Without knowing more about the clandestine program of the past few years, it is impossible to estimate the lead-time required for Iraq having an operational nuclear weapon. The time required will be largely dependent on the quality of personnel Iraq can assemble to work on the nuclear program, and on the availability of imported items it may need. Regarding the former, it is likely that Iraq has intact an excellent nuclear team, as David Albright and Khidhir Hamza wrote in 1998:

Iraq is known to have kept its nuclear weapon teams together following the Gulf War. These teams are kept together by force and intimidation. They appear not to be significantly reduced in size or number from before the Gulf War. Many of these scientists are now in "unreal career paths," according to one Action Team inspector, and could be quickly redirected to nuclear weapons activities, if a decision were made to do so. Iraq has a relatively complete set of documents, despite its frequent protestations to the contrary. It has undoubtedly continued since the war collecting relevant data, reports and information throughout the world. Travel by Iraqis and Internet access have continued.

Following the Gulf War, Iraq established a program at its universities to train a new generation of nuclear scientists and provide more advanced instruction to members of the program. The new scientists are viewed as more loyal to the regime and may apply their expertise only in Iraq, further inhibiting defections. Many key nuclear scientists also gained experience and confidence after the war by rebuilding Iraq's civil industries. Nuclear scientists were instrumental in putting oil refineries, telephone exchanges and power stations back into operation under adverse conditions.¹⁵

If Iraq is not able to acquire special nuclear materials for a weapon, it may turn to a radiological weapon, which is well within Iraq's current capabilities. By combining high explosive with radioactive materials, Iraq could create a weapon that would wreak havoc by contaminating large areas, such as cities or battlegrounds, and creating hazards for all humans and animals at the site. Use of such weapons would cause terror, inhibit the operations of Iraq's enemy in the affected territory, and render the area unusable for civilians until it could be cleaned.

Although there have been reports that Iraq sought to make a radiological weapon, Baghdad has denied doing so. Nevertheless, it is well within Iraq's capabilities and would be easier to accomplish than a device with nuclear yield.

Missiles

In its resolution 687 (1991) of 3 April 1991, the Security Council required Iraq to unconditionally accept the destruction, removal or rendering harmless, under international supervision, of all ballistic missiles with a range greater than 150 kilometres and related major parts, and repair and production facilities. Nevertheless, Iraq may continue to retain proscribed missiles as well as substantial missile production capabilities.

The Al Hussein

The backbone of Iraq's missile program is the one most prominently used in Iraq's war with Iran and later in the 1990-91 Gulf War—the Al Hussein. The Al Hussein is essentially a stretched Scud B¹⁶ (see Table 3). It was assembled using parts from the more than 800 Scud B's which were supplied by the Soviet Union in the 1970s and 1980s. Iraq cut some Scud Bs apart and inserted airframe sections from other Scud Bs. This increased the fuel and oxidizer capabilities and lowered warhead throwweight. Iraq experimented with various combinations, two of which were named Al Abbas and Al Hijara. However, its Al Hussein is the one most successfully and extensively deployed and used.

The Scud, including the Al Hussein variant, has a guidance system that consists of unsophisticated gyroscopes. These guide the missile only during powered flight, which lasts about 80 seconds. Once the rocket motor shuts down, the entire missile with the warhead attached coasts unguided to the target area. Consequently, Scuds have notoriously poor accuracy, and the farther they fly, the more inaccurate they become. It is important to keep in mind, however, that even with their inaccuracy, the Scuds and Scud variants can be deadly. Of the 148 U.S. battle deaths during the 1990-91 Gulf War, 28 resulted from Al Husseins. Also, Iraqi use of Al Husseins against Tehran in 1988 resulted in killing over 2,000 and injuring 6,000 people. Their use also inspired widespread terror. Over 2 million Iranians fled the city during the period the capitol was under attack from missiles.¹⁷

	Scud B	Al Hussein
Length (ft.)	36.8	41
Diameter (in.)	35	35
Warhead Wt. (lbs).	2,200	308-550
Max Range (mi.)	186	500-560
Accuracy (CEP, mi.)	.62	1.9-3.1
Gulf War Use	None	All but 5 fired were this model

Iraq began the reverse engineering and production of Al Hussein missiles in 1987. Iraq acquired the ability to produce and assemble all airframe components (fuel and oxidizer tanks, engine covers, instrument compartments and warheads). It also procured guidance and control instruments and their components, and liquid propellant engines, all of which Iraq could indigenously assemble. Prior to 1991, Iraq successfully tested indigenously assembled engines, airframes, and some guidance and control instruments. It also conducted four flight tests in 1990 of missiles with Iraqi-manufactured engines.

Iraq also produced fixed and mobile launchers for Al Hussein missiles. Iraq procured 50-tonne flatbed trailers on which it erected launcher equipment. These trailers remain in Iraq's possession and could be readily prepared as mobile launchers.

By 1997, UNSCOM was fairly certain that Iraq's imported Scuds were accounted for and destroyed. It stated, "The Commission is now in a position to be able to account for practically all, except two, imported

combat missiles that were once the core of Iraq's proscribed missile force."¹⁹ This does not resolve the uncertainty over Iraq's indigenously produced missiles, however. An inventory by Iraq contained reference to 7 missiles it manufactured and claimed to have destroyed. As there is no evidence that could prove the destruction, the missiles may still be in inventory.

The likelihood that proscribed missiles exist is supported by the fact that Iraq also has not accounted for over 500 tonnes of imported propellants. These propellants are useful only for missiles claimed by Iraq to have been destroyed. Additionally, Iraq continued its efforts to import guidance components for Al Husseins, which seemingly would be unnecessary unless such missiles either continued to exist or further production were planned.

SA2 Volga SAM, Modified

Iraq sought to build a missile R&D and production infrastructure and use it as the basis for longer-range missiles. Specifically, Iraq continued to work on short-range (150 km or less) missiles, which were allowed under UN resolutions. Iraq's missiles include two short-range missiles, the solid-fueled Ababil-100 and the liquid-fueled Al Samoud. These programs became the basis for maintaining missile-related facilities and a significant cadre of engineers, scientists, and technicians.

One of the efforts undertaken using the short-range missile programs as a cover was an attempt to modify Volga/SA2 surface-to-air missiles for a surface-to-surface application. One version of the modification, dubbed Fahad by Iraq, was to have a range variously described as 300 or 500 kilometres. Twenty-one flight tests of Fahad missiles were declared to have been conducted by Iraq before the Gulf War, but no supporting documentation was provided by Iraq regarding how many such missiles were modified.²⁰

Another modification of the Volga/SA2 was a surface-to-surface missile called "J-1." The J-1 had some specifications similar to the Ababil 100, a non-proscribed missile. Iraq admitted that its intention had been to hide the undeclared J-1 project from inspectors within allowed programs at declared missile facilities. Components for J-1 missiles were hidden or removed before visits of inspection teams.

Although the J-1 project was declared abandoned in May 1993, Iraq declared that prototypes of the J-1 missile were built and six flight tests were conducted in January - April 1993. Iraq also stated that some of the hardware associated with the project had unilaterally been melted in foundries after the J-1 project had been stopped.

Unmodified, declared Volga missiles were under the Commission's monitoring until 1998. Since the end of inspections and monitoring, Iraq could have modified the missiles for a surface-to-surface application or for delivery of non-conventional warheads.

Unmanned Aerial Vehicles (UAVs)

As of 1999, the year after UNSCOM inspections were ended by Iraq, the CIA reported that Iraq was continuing work on its L-29 unmanned aerial vehicle (UAV) program.²¹ This program is to convert L-29 jet trainer aircraft originally acquired from Eastern Europe. It is believed that Iraq may have been conducting flights of the L-29, possibly to test system improvements. These refurbished trainer aircraft probably have been modified for delivery of chemical or, more likely, biological warfare agents. Additionally, Iraq has other cruise missiles and unmanned aerial vehicles that also might be used for BW delivery (See Table 4).

Missile	Range (km)	Payload (kg)	Supplier
Armat	90	150	France
AS-11 (Kilter)	50	130	Russia
C-601/Nisa 28	95	513	China
Exocet (AM-39)	50	165	France
FAW 150	150	500	Indigenous
HY-2 Silkworm	95	513	China
Otomat (Mk1)	80	210	Italy
SS-N-2c (Styx)	80	513	Russia
YJ-1/C-801	40	165	China

Throughout the inspections period, Iraq pursued development of short range ballistic missile (SRBM) systems, possibly expanding their capabilities to make longer range systems. Authorized pursuit of UN-permitted missiles allowed Baghdad to develop technological improvements and infrastructure that could be applied to a longer-range missile program. In 2000, the Central Intelligence Agency stated, "We believe that development of the liquid propellant Al-Samoud SRBM probably is maturing and that a low-level operational capability could be achieved in the near term. The solid-propellant missile development program may now be receiving a higher priority, and development of the Ababil-100 SRBM and possibly longer range systems may be moving ahead rapidly."²³

Iraqi Intentions

Iraq's threat to the U.S. and its allies can be aptly described as "asymmetric," a term that has recently been used in national-security and defense-related literature to describe threats posed by some nations that are, overall, militarily less-capable than their opponents. "Asymmetric" describes a situation in which an adversary employs weaponry or tactics in unexpected or unsanctioned ways. Asymmetry also describes a situation in which the attacker is willing to use weapons and tactics that the victim is unwilling to use, possibly because they are viewed as immoral or illegal.²⁴ The use of asymmetric weapons and tactics can enable an adversary to win against a more powerful enemy—an enemy that may be unable or unwilling to respond in-kind—as history has repeatedly proven.

Of course, the concept behind the term asymmetry is not new. When the American revolutionaries used unexpected guerilla tactics to fight British Redcoats, they refused the "tradition" of lining up in a row, with high visibility, to fire muskets at opponents. When North Korea and others stockpile biological agents for potential use against nations that have forsworn use of such weapons, they are refusing to abide by international treaties and norms.

Iraq's threat to the United States and its allies is decidedly asymmetric. Iraq not only has effective chemical and biological weapons—weapons that are not the U.S. or allied arsenals—it has a worldview and perspective that make use of these weapons likely in event of another conflict. Making matters even more lop-sided, the United States is unable to threaten in-kind retaliation and has been unwilling to clearly signal what it would do in response to Iraqi WMD use. To understand better the nature of the asymmetric threat posed by Iraq, we must examine both Iraq's worldview and past behavior, as well as the potential responses by the United States.

Iraq's View of the United States

The Iraqi leadership views the United States as malevolent toward the nation of Iraq. As the Deputy Prime Minister of Iraq has summarized U.S. intentions,

The genuine concern of the United States in the [Middle East] region is to control the region, control its wealth, control its resources, and secure Israel's supremacy over the Arab nation and the Arab homeland. The slogans about democracy and human rights are only excuses that the United States is using as propaganda material to justify its imperialist, hostile and tendentious policy against the Arab nation and Iraq in particular.²⁵

And, Iraq views itself as still being at war with the United States and the United Kingdom; the 1990-91 Gulf War has really not ended in the minds of the Iraqi leadership. UNSCOM and the inspections process are seen as an extension of U.S. aggression. Toward the end of ultimately being able to defeat the United States and prevent further U.S. involvement in the region, Iraq bides its time, preparing for future battle. Iraqi rhetoric reflects the view that it is only a matter of time until it will defeat the United States. As the Vice President of Iraq said,

[Saddam Hussein] believes that the Arab nation will emerge victorious no matter how much the enemies gang up on it and no matter how far the aggression goes. We will fight to the last citizen and we will be immortalized by history. They [the United States] will be placed in the garbage dump of history.²⁶

If Iraq were to use WMD in battle against the United States, it would, in its own view, be using tactics previously used by the United States against others. The Iraqi Permanent Representative to the United Nations summed up the Iraqi image of the United States, saying that America had been committing crimes against the people of Iraq, including

...the ongoing daily aggression in the unlawful no-flight zones; the maintenance of the comprehensive sanctions that have taken the lives of nearly 2 million Iraqis, most of them children and women; and the use of depleted uranium, which constitutes the crime of the epoch and 'moral barbarism' in its most manifest form. This is to say nothing of the American moral barbarism that found expression in the use of nuclear weapons against Japanese civilians at Hiroshima and Nagasaki, in the use of chemical weapons against the people of Viet Nam and biological weapons against the people of Cuba and in other crimes in all parts of the world.²⁷

While this quote could be dismissed as simple propaganda, it actually reflects a genuine perception that the United States undertakes actions that are both illegal and immoral. The United States is above using no tactic, regardless of how vile. The importance of this perspective is how it relates to the potential for Iraq's using WMD. In Iraq's view, if it were to respond to U.S. aggression with WMD, it would be doing nothing that the United States had not already done to its other victims.

Iraqi WMD Use

This section is to document the well-known uses of chemical weapons by Iraq against Iran and against its own people. It is also to make the point that these instances were not just the use of a highly effective weapon by a regime desperate to maintain power; they are indicative of a mindset alien to most decision-makers in western governments. The ruthlessness and disregard for individual life displayed by Saddam Hussein's regime must be understood: it is not an aberration for these rulers. Killing, even by such horrific means as chemical weapons, is an acceptable means to an end for them.

In the war between Iraq and Iran, the 1980-88 Gulf War, Iraq faced the prospect of losing substantial territory to Iran. To turn the situation to its advantage, Iraq began to use chemical weapons in 1981. The chemical weapons included H-series blister and G-series nerve agents. Iraq built these agents into rockets, artillery shells, aerial bombs, and warheads on Al Hussein Scuds. Mustard-filled and tabun-filled 250 kilogram bombs and mustard-filled 500 kilogram bombs were dropped from fighter-attack aircraft onto Iranian targets. Over 3,000 tons of chemical agent were weaponized and expended against Iran, according to official Iraqi declarations.

Despite early and convincing evidence of chemical weapons use, including badly burned casualties flown to European hospitals for treatment, it was not until March 1986 that then-UN secretary general, Javier Perez de Cuellar, formally accused Iraq of using chemical weapons against Iran. He based his accusation on a report prepared by four chemical warfare experts sent by the United Nations to Iran in February and March 1986. The report concluded that the weapons used included both mustard and nerve agents. In March 1988, Iraq was again charged with a major use of chemical warfare while retaking Halabjah, a Kurdish town in northeastern Iraq, near the Iranian border.

The use of CW in Halabjah, while it may have been intended to retake ground being lost to Iran, was also a punitive measure against the town's residents. The government of Saddam Hussein views the Kurds as unruly separatists determined to create another state out of current Iraqi territory. These tribal peoples are thus viewed as enemies of the state who must be either defeated or eliminated. As they have been impossible to repress over many decades, the central government concluded that the only alternative—other than power-sharing or some other peaceful resolution that the leadership would view as capitulation—is annihilation. In the 1980s, the Kurds sought to use the Iran-Iraq war to pursue their own aims of independence. Saddam Hussein's government responded with CW attacks, killing thousands and creating a mass exodus of Kurds from Iraq into Turkey.

On the 13th anniversary of the most infamous attack known against civilians with chemical weapons, the U.S. State Department issued the following statement that summarizes the events:

On March 16, 1988, an estimated 5,000 civilians were killed and 10,000 injured when Iraqi air forces bombarded Halabja with mustard and other poison gases. Thirteen years after the massacre, the people of Halabja still suffer from very high rates of serious diseases such as cancer, neurological disorders, birth defects and miscarriages. Saddam Hussein's chemical weapons attack on Halabja was not an isolated incident. It was part of a systematic campaign ordered by Saddam Hussein and led by his lieutenant, Ali Hassan al-Majid, the infamous "Chemical Ali," against Iraqi Kurdish civilians. International observers estimate Iraqi forces killed 50,000 to 100,000 people during the 1988 campaign known as "Anfal" which means "the spoils."²⁸

The use of chemical weapons against the Kurds is extensively documented by various medical and epidemiological researchers.²⁹ What cannot be documented, however, is whether biological weapons were used also. It is possible, for example, that the Iraqi government manufactured aflatoxin for genocidal purposes. This cancer-causing agent would be of little battlefield utility, given that its effects would take years to emerge. Also, employment of aflatoxin in battle would probably go undetected, so its terror factor would be of little use. Yet, aflatoxin would be effective in causing cancer in a target population.

The extreme ruthlessness of the Iraqi government toward those whom it views as enemies continues, despite the protection afforded by two so-called "no fly zones" that prevent Iraqi aircraft from attacking citizens in the north and south. The U.S. Department of State issued a report in September 1999³⁰ stating:

- Iraqi authorities routinely practice extrajudicial, summary or arbitrary executions of Iraqis. The total number of prisoners executed between late 1997 and mid-1999 exceeds 2,500.
- In the 1990's, the regime has forced relocation of Kurdish and Turkomen families to the south, displacing over 900,000 citizens.
- In the southern marshes, government forces drained and poisoned marshes, with devastating effect on the environment.

The values and perspectives of the Iraqi leadership are such that they would be willing to use WMD, regardless of the impact on the environment or the cost of human life, if it were to suit their purposes. Why, then, was WMD not used in the Gulf War against the United States and its allies? The answer given by very-high-level Iraqi officials is that they were afraid of retaliation with WMD by either Israel and/or the United States.³¹

Although nuclear deterrence worked for the United States in 1990-91, it may not do so in a future conflict with Iraq. The reason is that Iraq now may perceive that the United States is unwilling to use nuclear weapons in any situation other than retaliation against nuclear weapons. This perception might come from several factors. Many of the individuals with whom Iraqis dealt in the inspections process are deeply committed to abolition of nuclear weapons and have the personal opinion that there is no justification for nuclear use. It is possible that they conveyed their skepticism about the likelihood of U.S. nuclear retaliation. More importantly, the Iraqis no doubt have observed the U.S. unwillingness to categorically state a nuclear-weapons deterrence policy against nations that use CW or BW against the U.S. or its allies.

Implications of Iraqi WMD for the United States

Mustering political support from the U.S. public and from Congress for introducing U.S. ground troops on behalf of Kuwait was difficult in 1990. There was tremendous reticence about becoming involved in a conflict in which U.S. or allied lives might be lost. And that was when it was generally assumed by the U.S. Government that Iraq had no nuclear or biological weapons, and very poor delivery systems and doctrine for CW use. In the future, any U.S. leader may be even more wary of sending U.S. troops into the Middle East, fearing they might become victim to WMD use. This hesitation will be reinforced by the fear that any WMD use might necessitate nuclear retaliation. In the view of many, no president is likely to want to be recorded by history as one who ordered use of nuclear weapons.

Because the United States will be very unwilling to become involved in a conflict with a WMD-armed Iraq, U.S. military options will be limited primarily to air operations. The damage that can be inflicted from air campaigns is likely to be bearable and acceptable to Iraq.³² This is, in part, due to yet another limitation that the United States places on itself—the policy of avoiding civilian targets and limiting collateral damage. This is not a judgement of that policy; it is a simple statement that the policy results in diminished effects, and therefore is less deterrent value.

In addition to the problem of political support within the United States for any military action against Iraqi forces, it is probable that U.S. allies will also be unwilling to engage Iraq militarily if it is to mean potentially exposing their troops to WMD use. This will make it extraordinarily difficult to organize the type of coalition that ousted Iraq from Kuwait. Unless there is a sea change in attitudes of the U.S. and allied publics, Iraq will be able to deter future western intervention in any Middle Eastern conflict in which WMD could be used. What might this mean in the near-term?

One possible scenario is that Iraq will again attack a neighboring country, as it did Kuwait and Iran. At present, the United States is highly vulnerable economically to any cut off of Middle Eastern oil. The choice could again become: either defend a country under attack from Iraq or face much higher prices for oil. Given the state of the U.S. economy in 2001, higher oil prices could mean recession in the United States.

If the United States were to choose to introduce ground troops against Iraq, it is better prepared today than in 1991. For example, the U.S. Defense Threat Reduction Agency has a program, along with U.S. Pacific Command, to speed technology and equipment to aid U.S. troops in event of a CBW attack. The \$58 million program is to improve defenses and reaction procedures, thus reducing the impact of CBW use.³³

Nevertheless, the United States is still likely to face large-scale casualties in event of WMD use. There is no certainty that U.S. forces will be able to detect the range of chemical and biological agents that could be used, nor is there surety that western defensive gear will be effective in protecting personnel. Additionally, there is a possibility that Iraq might employ a radioactive-material-spreading device. If the conflict were to take place in a few years, or if Iraq has somehow obtained nuclear materials for a nuclear weapon, Iraq could even use nuclear weapons. The effects of nuclear use would include not only loss of life and terror, it could render U.S. equipment and electronics unusable.³⁴

Because the United States will likely be unwilling to commit ground troops against Iraqi forces in the future, Iraq will probably become increasingly bold and aggressive. If so, and if indeed there is no repercussion for its behavior, other nations will observe. They will know that they, too, could act with greater impunity and reduce the prospects for outside interference if they had WMD. This lesson was not lost on India. As the late General Sunderji of India stated, "We learned from the Gulf War that one should not take on the United States unless one has weapons of mass destruction."³⁵ Thus, the incentive to other nations to gain one or a few WMD will be enhanced.

Conclusion

Iraq has the capability to deliver chemical and biological agents, as well as radiological materials, via numerous vehicles, including ballistic and cruise missiles. It may also have a limited number of nuclear weapons. Some of the agents Iraq possesses may be of types for which the United States has no detection equipment nor defenses. The severity of threat that these WMD may pose could result in limiting the willingness and abilities of the United States and its allies to intervene on behalf of Kuwait or any other nations that may be threatened by Iraq. This could have profound implications not only for the lives of those under attack in the region, but also for the U.S. economy.

In the past, the Iraqi government was deterred from using WMD for fear of nuclear retaliation by the United States and/or Israel. Deterrence worked and may work again.

To deter Iraq's (or any other nation's) potential use of WMD, the United States must clearly communicate both its will and capability to respond with overwhelming force, including nuclear weapons. This deterrent policy must be stated firmly, and should be based on longstanding U.S. policies regarding proportional response.

A credible proportional response must be one that matches the level of retaliation with the results of WMD use by attackers. Thus, it is not credible to deter small-scale chemical or biological attacks with the threat of large-yield nuclear weapons designed to destroy massive, hard Soviet-era ballistic missile bunkers. Rather, the United States must tailor an appropriate arsenal of nuclear warheads that can respond on a very limited, but devastating level. By announcing this policy of deterrence, and acting responsibly to

create the appropriate retaliatory force, the United States can hope to deter WMD use by Saddam Hussein and all his successors.

Endnotes

- ¹ Report of the Executive Chairman of the Special Commission, 6 October 1998, S/1998/920.
- ² U.S. Department of Defense, "WMD Security BDA," Briefing Charts, 19 December 1998. See <http://www.fas.org/news/iraq/1998>.
- ³ United Kingdom Ministry of Defense, "Iraqi CW Capability During the Gulf War," 9 February 1998.
- ⁴ The examples contained in this paragraph are drawn from the Fourth Report by the Executive Chairman of the Special Commission, 6 October 1997, S/1997/774.
- ⁵ Central Intelligence Agency, "Unclassified Report to Congress on the Acquisition of Technology Relating to Weapons of Mass Destruction and Advanced Conventional Munitions, 1 July Through 31 December 1999."
- ⁶ *U.S. News & World Report*, "Bad Chemistry: A mystery at a pesticide plant," 25 October 1999. This article stated, in part, "The two Russians, according to intelligence sources, are former subordinates of retired Gen. Anatoly Kuntsevich, the former deputy commander of the Russian Army Chemical Corps. Kuntsevich ran afoul of Russian authorities in an illicit 1994 attempt to ship chemical weapons components to Syria and, investigators suspected, from there to Iraq. United Nations weapons inspectors were tipped off last year that he, or people associated with him, were making overtures to Baghdad."
- ⁷ Because defensive chemical weapons research can also be used for offensive purposes, the United States has not maintained facilities and dedicated expertise in chemical weapons R & D. The Soviet Union, and later Russia, continued its chemical weapons R & D, despite commitments not to do so. This has led to the current situation, whereby the United States may be unable to counter the more modern, lethal Russian-designed chemical capabilities.
- ⁸ Iraq imported four principal types of growth media on which to produce microorganisms: casein, yeast extract, thioglycollate broth, and peptone. It also imported smaller amounts of other growth media.
- ⁹ Report of the Executive Chairman of the Special Commission, 6 October 1997, S/1997/774, paragraph 77.
- ¹⁰ This table is drawn, in part, from Steve Bowman, Congressional Research Service Issue Brief, "Iraqi Chemical & Biological Weapons (CBW) Capabilities," April 1998.
- ¹¹ Letter dated 8 April 1998 from the Executive Chairman of the Special Commission to the President of the UN Security Council, S/1998/308.
- ¹² Tim Youngs and Mark Oakes, "Iraq: 'Desert Fox' and Policy Developments," Research Paper 99/13, 10 February 1999, UK House of Commons Library, p. 26.
- ¹³ "Statement by Special Assistant to the Director of the Central Intelligence Agency for Nonproliferation, John A. Lauder, on the Worldwide Biological Warfare Threat" to the House Permanent Select Committee on Intelligence, 3 March 1999. See http://www.cia.gov/cia/public_affairs/speeches/archives/1999/lauder_speech_030399.html.
- ¹⁴ This quote was taken from an excellent summary of the state of the Iraqi nuclear weapons program at the time of the 1990-91 Gulf War. See John Pike, "Iraq's Nuclear Weapons Program at <<http://www.fas.org/nuke/guide/iraq/nuclear/program.htm>>
- ¹⁵ David Albright and Khidhir Hamza, "Iraq's Reconstitution of Its Nuclear Weapons Program," *Arms Control Today*, October 1998.
- ¹⁶ The Scud B is a mobile, single-stage, single-warhead, liquid-fueled, short-range ballistic missile which first appeared in Soviet operational forces in 1962.
- ¹⁷ Bernard Rostker, "Information Paper: Iraq's Scud Ballistic Missiles," U.S. Department of Defense.
- ¹⁸ This table is drawn from Bernard Rostker, "Information Paper: Iraq's Scud Ballistic Missiles," U.S. Department of Defense. See <http://www.iraqwatch.org/government/us/pentagon/dodscud.htm>.
- ¹⁹ "Report of the Secretary-General on the Activities of the Special Commission Established by the Secretary General pursuant to paragraph 9 (b) (I) of Resolution 687 (1991)," S/1997/774, paragraph 123.
- ²⁰ Report of the Executive Chairman of the Special Commission 25 January 1999.
- ²¹ Central Intelligence Agency Unclassified Report to Congress on the Acquisition of Technology Relating to Weapons of Mass Destruction and Advanced Conventional Munitions, 1 July Through 31 December 1999.
- ²² Michael Barletta and Erik Jorgensen, "Weapons of Mass Destruction in the Middle East," Monterey Institute of International Studies, May 1998. See chart at <http://www.miis.edu>.

²³ Central Intelligence Agency, "Unclassified Report to Congress on the Acquisition of Technology Relating to Weapons of Mass Destruction and Advanced Conventional Munitions, 1 January through 30 June 2000."

²⁴ For example, asymmetric threats can include those that would result in widespread civilian casualties or that cause unusual or unnecessarily cruel pain among victims. The current spate of terrorism against the United States is an example of asymmetric tactics that employ actions widely viewed as immoral.

²⁵ Tariq Azziz, Deputy Prime Minister of Iraq, Interview on Al-Jazira Satellite Television (Qatar) on 28 June, Radio Free Europe/Radio Liberty, 2 July 1999, Volume 2, Number 24.

²⁶ Taha Yasin Ramadan, Interview in Arabic 19 December 1998, Foreign Broadcast Information Service.

²⁷ Mohammed Al-Douri, Permanent Representative of Iraq to the United Nations, Letter to the UN Secretary General, 5 May 2001, S/2001/450, 8 May 2001.

²⁸ U.S. Department of State, Statement by Spokesman Richard Boucher, 16 March 2001.

²⁹ See, for example, Hu, Howard, Cook-Deegan, Robert, and Shukri, Asfandiar, "The Use of Chemical Weapons: Conducting an Investigation Using Survey Epidemiology," *Journal of the American Medical Association*, August 4, 1989 - Vol. 262, No. 5. See excerpt at http://www.phrusa.org/research/chemical_weapons/chemjourn.html.

³⁰ U.S. Department of State, "Saddam Hussein's Iraq," 13 September 1999.

³¹ This statement was made by the Iraqi Deputy Prime Minister to one-time head of the Special Commission on Iraq, Rolf Ekeus (private communication with the author, 1995) and by Hussein Kamil in August 1995 (as quoted in Rostker, Bernard, "Information Paper"). Kamil was Saddam Hussein's brother-in-law and former chief of Iraq's nuclear, chemical, and biological weapons programs.

³² For example, the Desert Fox campaign designed to significantly degrade Saddam Hussein's WMD capabilities resulted in damage that was quickly repaired. Even U.S. analysis of the damage, which could be expected to be optimistic, concluded that the facilities hit would be rebuilt in less than a year.

³³ Clem Gaines, "Restoration of Operations Exercise Looks at New Technologies," *Defense Threat Reduction Agency Connection*, Vol. 3, No. 3, March 2001, p. 4.

³⁴ Nuclear weapons explosions produce electromagnetic pulses that can ruin unshielded electronics.

³⁵ Statement to the author in 1993.