

# CRS Report for Congress

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## Iraqi Chemical & Biological Weapons (CBW) Capabilities

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### Summary

Since 1991, the United Nations Special Commission (UNSCOM) has destroyed over 38,000 filled and unfilled chemical weapons (CW) munitions, 690 metric tons of CW agents, 3,000 metric tons of CW precursor chemicals, and over 400 pieces of CW production equipment. The Iraqi government maintains that all its chemical and biological weapons (CBW) arsenal and production capability has been destroyed either by UNSCOM or in 1991 by the Iraqis themselves in unauthorized activities which violated U.N. Security Council Resolution 687. UNSCOM maintains that Iraq has not provided verification of this destruction, and has a substantial record of deception and omission in its CBW declarations to the United Nations. British and U.S. intelligence reports in February 1998 and the UNSCOM report to the Security Council in April 1998 assert that Iraq has not accounted for and may still possess a significant CBW capability, including: 500-700 mustard agent artillery shells, over 150 bombs filled with BW agents, and 45 CBW missile warheads. In addition, UNSCOM believes that Iraq manufactured over 200 metric tons of the persistent nerve agent VX, but has accounted for only 3.9 tons. Growth medium sufficient to produce 16,000 liters of anthrax has also not been accounted for. These reports are based on defector debriefings, records of purchases, and Iraqi documents. U.N., British, and U.S. officials believe that without continuous U.N. monitoring, Iraq would be capable of restoring its CBW production within months. Owing to obstruction of UNSCOM inspections, the question of airstrikes against suspected CBW sites has arisen, but lack of certainty about targets and concerns about collateral casualties have inhibited action. Potential casualties from the *purposeful* use of CBW were estimated by the Office of Technology Assessment, using a Washington DC scenario, to range from several hundred to several million, depending on the agent used and weather. A glossary of CBW terms is appended to this report. This report will be updated only to reflect substantial new information. For additional information, see CRS Issue Brief 92117 *Iraqi Compliance with Cease-fire Agreements*, by Kenneth Katzman.

## Iraq's Chemical and Biological Arsenal

In April 1991, the United Nations Security Council established the cease-fire conditions for the conflict in the Persian Gulf. Iraq accepted Security Council Resolution 687, which required the destruction or neutralization of 1) all nuclear, chemical, and biological weapons, and 2) all ballistic missiles with a range over 150 kilometers (90 miles). SCR 687 also prohibited Iraq from future development, production, or use of such weapons. Subsequently, Security Council Resolution 715 established the United Nations Special Commission (UNSCOM) to monitor and verify Iraqi compliance with these disarmament requirements. Since 1991 UNSCOM inspectors in Iraq have overseen the destruction of, or accounted for <sup>1</sup>:

- 40,000 chemical munitions (28,000 filled, 12,000 empty)
- 480,000 liters of chemical warfare agents (690 metric tons)
- 1,800,000 liters of CW precursor chemicals (3,000 metric tons)
- 819 Russian-supplied SCUD ballistic missiles
- 19 mobile missile launchers
- 30 CBW missile warheads (additional unearthed warheads are being evaluated)
- 490 pieces of CW production equipment

During the last seven years of inspections, the Iraqi government has made many declarations concerning the volume and disposition of its chemical and biological weapons programs — all of which have been proven or judged to be inaccurate or incomplete. In March 1998, an independent international panel of experts judged Iraq's 1997 CBW declarations to be “incomplete, inadequate, and technically flawed”.<sup>2</sup> No admission of their extensive biological weapons program or the production of the persistent nerve agent VX was made until Iraqi defectors forced acknowledgment in 1995. Iraq then claimed that all BW agents and materials had been destroyed — a claim rejected by both UNSCOM and Western intelligence agencies. As incomplete as they may be, Iraqi declarations indicate a very extensive CBW program. UNSCOM guidelines required the confidentiality of its reports, and it is only this year that some details have been released by the United Nations, and the U.S. and British governments. Information released so far indicates that Iraq acknowledged producing prior to the Persian Gulf conflict:<sup>3</sup>

- 3.9 tons of VX persistent nerve agent
- 19,000 liters of botulinum toxin
- 8,400 liters of anthrax
- 2,200 liters of aflatoxin
- unspecified amounts of the nerve agent Sarin and the blister agent “mustard gas”

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<sup>1</sup> *Iraq Weapons of Mass Destruction Programs*, U.S. Government White Paper. February 13, 1998, p. 11. [http://www.usia.gov/regional/nea/iraq/whitepap.htm#wp8 ]

<sup>2</sup> *Report of the Executive Chairman on the Activities of the Special Commission established by the Secretary-General pursuant to paragraph 9 (b) (i) of resolution 687 (1991)*. April 18, 1998. p. 15. Hereafter, the UNSCOM Report.

<sup>3</sup> *Iraq Weapons of Mass Destruction Programs*, pp. 5,11.

In violation of SCR 687, Iraq did not turn over these agents to UNSCOM, but claims to have destroyed them unilaterally in mid-1991. Iraq has also acknowledged that prior to the Persian Gulf conflict it manufactured 100 botulinum bombs, 50 anthrax bombs, and 7 aflatoxin bombs. In addition, 25 missile warheads were filled with biological agents: botulinum (16), anthrax bacillus (5), and aflatoxin (4). UNSCOM maintains that the claimed destruction of these biological munitions “cannot be reconciled with the physical evidence”.<sup>4</sup> In the opinion of Richard Butler, UNSCOM Director, Iraq “has failed to give a remotely credible account of [its] BW program.”<sup>5</sup> UNSCOM is also seeking information regarding the disposition of an additional 200 mustard agent shells and 500 CBW bombs. Iraq has also acknowledged researching rockets, drone aircraft, and aerosols as CBW delivery systems.

UNSCOM and U.S. and British intelligence agencies believe that Iraq has hidden stores of CBW agents, production equipment, ballistic missiles, and missile warheads. For example, Iraq has acknowledged production of only about 4 tons of VX, but possessed sufficient precursors for over 200 tons. Information is sketchy because much is classified, and even the classified information is reportedly incomplete. Reports issued by UNSCOM, and the U.S. and the British governments, however, have provided some information:<sup>6</sup>

- British intelligence believes that up to ten SCUD missiles capable of carrying CBW warheads remain hidden.
- UNSCOM reports that between 40-70 CBW-capable missile warheads are unaccounted for.
- Iraq possessed enough growth medium to produce over 16,000 liters more anthrax than has been acknowledged.
- 4,000 tons of CW precursor chemicals are unaccounted for; enough to produce several hundred tons of CW agents.
- 31,000 CW munitions remain unaccounted for, including 500-700 mustard agent artillery shells and 500 empty and filled CBW bombs.
- Essential CW production equipment remains unaccounted for.
- It is believed that Iraq may retain undetermined amounts of Ebola virus, bubonic and pneumonic plague bacteria, and the toxin ricin.

In June 1998, fragments of warheads destroyed unilaterally by Iraq were discovered to contain VX, the persistent nerve agent which Iraq had claimed never to have

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<sup>4</sup> UNSCOM Report, April 1998, p. 17

<sup>5</sup> *Iraq Weapons of Mass Destruction Programs*, U.S. Government White Paper, February 13, 1998, p. 4. [<http://www.usia.gov/regional/nea/iraq/whitepap.htm#wp8>]

<sup>6</sup> *Iraqi Threat and UNSCOM Work*, British Foreign and Commonwealth Office, February 4, 1998 [<http://www.fco.gov.uk/news/newstext.asp?296>], *Iraqi Weapons of Mass Destruction Programs*, U.S. Government White Paper, February 13, 1998, [<http://www.usia.gov/regional/nea/iraq/whitepap.htm#wp8>]

weaponized, confirming another CBW weapons production program which remains unaccounted for.<sup>7</sup>

During the standoff over UNSCOM inspections in late 1997, the question of military action against suspected CBW sites arose. The debate over the advisability of airstrikes highlighted two significant challenges in the efforts to eliminate Iraq's CBW arsenal: 1) the great difficulty of locating and destroying CBW stocks through air power alone, and 2) the relative ease of reconstituting a CBW production program after such attacks, particularly if the goal is relatively small amounts suitable for terror attacks. The estimates for reconstitution have ranged from weeks to months, unless a close monitoring regime is maintained. Press reports indicate that even under the UNSCOM regime and the U.N. embargo on CBW-related equipment, Iraq may have the ability to acquire equipment that could be used to produce chemical or biological weapons.<sup>8</sup> Were such procurement to occur, reconstitution of a significant CBW capability would be relatively simple. Production of smaller amounts of CBW agents for terrorist use would be proportionately easier, and employment need not involve sophisticated delivery systems.

A major concern regarding airstrikes is the probability and effect of releasing CBW agents into the air as a result of bombing, and consequent collateral casualties. There is a high degree of unpredictability in any estimate. This has been exemplified by the difficulties that those investigating the so-called "Persian Gulf War Syndrome" have experienced in determining how many, if any, U.S. troops may have been exposed to some level of nerve agent after the U.S. destruction of an Iraqi munitions depot shortly after the Persian Gulf conflict. A variety of factors would affect whether contamination would be localized or widespread, temporary or long-term. These include: type of CBW agent, type of munition, target location, population density, wind, humidity, level of sunlight, and temperature. There are U.S. munitions in the experimental stages intended specifically to reduce collateral contamination by penetrating bunkers before detonating or by destroying CBW agents through incineration rather than explosion. It is not clear, however, whether these weapons could be deployed while still under development.

For the intentional use of chemical and biological weapons, predictive models of lethality do exist. In 1993, the Office of Technology Assessment developed the following estimate using the District of Columbia as the hypothetical target under three different weather conditions. The scenarios assumed aerosol agent distribution by an aircraft flying a line along the western city limit. Estimated *fatalities* resulting from the dispersal of approximately one ton of Sarin nerve agent or 220 lbs of anthrax spores are provided in the table below.<sup>9</sup>

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<sup>7</sup> "Iraqi Nerve Gas Tests Confirmed", *Washington Post*, June 25, 1998, p. 30

<sup>8</sup> "Did Russia Sell Germ Warfare Equipment?", *Washington Post*, February 12, 1998. P. 1.

<sup>9</sup> *Proliferation of Weapons of Mass Destruction: Assessing the Risks*, Office of Technology Assessment. 1993. p. 53,

	Clear sunny day, light breeze	Overcast or night, moderate wind	Clear calm night
Sarin	300-700	400-800	3,000-8000
Anthrax	130,000-140,000	420,000- 1.4 million	1-3 million

Press reports and commentaries which carry even more distressingly high fatality estimates are generally calculated simply by determining how many lethal “doses” of agent could be supplied by the Iraqi stockpile. This type of estimate does not take into account any of the factors affecting actual employment.

## Conclusions

Though Iraq’s CBW capability has been reduced over the last seven years, the suspected residual capability still remains a regional destabilizing factor as potentially part of a military campaign or as terror weapons. Even if never employed, a suspected arsenal creates a threat environment which continues to fuel a regional CBW arms race. UNSCOM intends to continue its efforts to obtain full disclosure and verification of the destruction of Iraq’s CBW capability; however, there are serious questions whether the Security Council can provide the political support necessary for these efforts. Of the permanent members, China, Russia, and France have not supported further coercive measures to compel Iraq’s compliance. As the recent disclosures surrounding the resignation of UNSCOM Inspector Scott Ritter have revealed, even the United States and Great Britain have on occasion privately urged restraint on UNSCOM inspectors.<sup>10</sup> At this point, it appears that Iraq is determined to retain whatever CBW capability it can despite UNSCOM efforts, and to resume clandestine production as soon as a reduction in U.N. monitoring makes this possible.

## Chemical and Biological Agent Characteristics

**Nerve Agents** — These agents disrupt normal functioning of the central nervous system. They are colorless, tasteless, and odorless. **Sarin** is delivered as an aerosol and evaporates rather rapidly. Inhalation of 100 milligrams is lethal. **VX** is a persistent agent (effective for days or weeks depending upon climatic conditions) Absorbed through the skin, 5-10 milligrams are lethal. Exposure to nerve agents results in nausea, diarrhea, pulmonary edema, and convulsions leading to death by respiratory arrest in within one to fifteen minutes, depending on the concentration.

**“Mustard Gas”** — “Mustard gas” is actually an oily brownish liquid with a smell similar to garlic. It is a vesicant or blister agent. It is generally severely incapacitating rather than lethal, though intense or prolonged exposure can lead to fatal pulmonary edema. An incapacitating dose is about 200 milligrams, and 1,500 milligrams inhaled is

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<sup>10</sup> “U.S. Fought Surprise Iraqi Arms Inspections” *Washington Post*, August 14, 1998, p. 1.

sufficient to kill. Mustard gas damages any tissue it contacts, causing extensive and large blisters which last several weeks. Permanent damage to the lungs and eyes can result.

**“Agent-15”** — The British government recently asserted that Iraq developed large stocks of an incapacitant gas dubbed “Agent-15”. It is apparently a glycollate similar in effect to the agent **BZ**, an incapacitant once produced by the United States. If this is correct, exposure to about 100 milligrams in aerosolized form would be sufficient to incapacitate. Symptoms, which begin within 30 minutes of exposure and may last several days, include dizziness, vomiting, confusion, stupor, hallucinations, and irrational behavior. The U.S. Army considered BZ to be too unpredictable in its effectiveness to be useful on the battlefield, and all U.S. stocks were destroyed.

**Anthrax** — Anthrax is a disease caused by the bacillus *Anthraxis*. Infection can result from inhalation, ingestion, or absorption through the skin. Most effectively dispersed as an aerosol, anthrax spores decay in a matter of days in sunlight, but can contaminate soil for decades. 10,000 to 20,000 spores is a lethal dose — “something smaller than a speck of dust,” according to a DOD biological warfare expert<sup>11</sup>. Symptom onset occurs 3-4 days after exposure, and initially resembles that of a common cold. Symptoms do not become identifiable as anthrax until the fatal phase of the disease, when vomiting, severe head and joint aches, and respiratory distress lead to death within 1-3 days. Vaccines are available against some forms of anthrax, but their efficacy against abnormally high concentrations of the bacteria is uncertain. Antibiotic treatment can be effective, but only if administered prior to the onset of symptoms, otherwise the fatality rate can exceed 90%.

**Aflatoxin** — Aflatoxins are toxins produced by the *aspergillus flavis* and *aspergillus parasiticus* fungi. They occur naturally on moldy grains and foodstuffs. The toxic dosage for humans has not been determined, but one type is considered a potent cause of liver cancer.

**Botulinum Toxin** — Botulinum, produced by the *clostridium botulinum* bacteria, causes the food-poisoning “botulism”. In pure form, it is a white crystalline substance, that is readily dissolvable in water, but decays rapidly in the open air. The symptoms of botulism begin 12-72 hours after exposure depending upon whether it is inhaled or ingested. Symptoms include nausea, diarrhea, paralysis of the throat, and convulsions, followed by death due to respiratory arrest. Vaccines are available, but again, their efficacy against abnormally high toxin dosages is uncertain. Early diagnosis and palliative treatment can prevent fatality.

**Clostridium Perfringens** — *Clostridium Perfringens* is a widespread bacterium which causes gas gangrene if allowed to grow in wounds or damaged tissue. The bacteria produce gases that cause intense swelling and toxins that kill muscle tissue. If not treated the bacteria enter the bloodstream causing fatal systemic illness. Early antibiotic treatment is effective, if undertaken before significant amounts of toxins have accumulated in the body.

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<sup>11</sup>Transcript, Department of Defense press conference, November 14, 1997.