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Investigating Iraq's Chemical Warfare Program:
Updated and Expanded Research Plan

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Investigating Iraq's Chemical Warfare (CW) Program

by

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July 2012

Introduction

Of eight thematic sections that constitute our Minerva project, the second, *Iraq's WMD Procurement and Deployment*, and third, *The State and the Iraqi Military*, include substantial elements that deal directly or indirectly with Iraq's chemical warfare (CW) program. Unlike previous publications that seek to address Iraq's acquisition and employment of chemical weapons, and there are many, this project takes advantage of the primary information sources available to James Martin Center for Nonproliferation Studies (CNS) researchers at the Conflict Records Research Center (CRRC) to investigate and clarify Iraqi ideas, concepts, and understandings of the country's CW program, including the tactical and strategic applications of its creations against external and internal enemies. Thus, for example, based on taped meetings of the Iraqi Revolutionary Command Council, Saddam Hussein, himself, will inform us about his views on the employment of chemical weapons and targets for chemical attacks and, when he chooses to do so, provide reasons for his views.

When we first started to work with the CRRC's Saddam Hussein Regime Collection, it contained about 850 Iraqi state records (over 31,000 pages), and included only documents dated prior to April 9, 2003. This is a very small proportion of what is available, namely more than 600,000 original captured Iraqi documents and several thousand hours of audio tapes and video footage.

This report has two sections. The first section presents our Chemical Research Plan and explains its five objectives. The second discusses the mostly technical reasons why it so far has been problematic to carry out the Chemical Research Plan and presents approaches for overcoming these technical barriers. In addition, there are three annexes. Annex 1 contains an overview of the Iraqi Saddam Hussein (SH) Collection as of May, 2012. Annex 2 has five examples of new information derived from the still classified documents of the SH Collection. Annex 3 is a chronology of Iraq's chemical weapons production activities (1931 – 1998)

I. Chemical Research Plan and Its Objectives

The underlying assumption of our Chemical Research Plan is that the documents and audio tapes made available to us at the CRRC, augmented by information derived from interviews with Iraqi principals, contain the information needed to accomplish the Chemical Research Plan's five major components, which are as follows.

1. Learning Iraq's CW Doctrine

We define doctrine for Iraq's CW program as: "A general articulation of how a chemical weapons capability contributes to Iraq's military objectives at the tactical and strategic levels;

Iraq's CW doctrine may have included cautions and concerns about the use of chemical weapons." To date, we have seen no official Iraqi doctrine for its CW program. However, one official Iraqi source, Iraq's "Full, Final, and Complete Disclosure of May 1996" submitted to the United Nations Special Commission (UNSCOM), has provided the overriding objective of Iraq's CW program: "Chemical weapons were developed and produced to be used only in urgent cases against the enemy's deep penetration into the Iraqi borders." This objective undoubtedly is incomplete since, for example, it does not encompass use against internal enemies, and we know that Iraq made substantial use of chemical weapons against its Kurdish and Shi'a populations.

If an Iraq CW doctrine existed, and we believe it must have existed in some form, it means that the Iraqi intelligence services and or military had decided that, in the first instance, Iranian forces were vulnerable to chemical attacks (only Iranian forces were in a position to effect deep penetration into Iraq). Finding out how the Iraqi intelligence and/or military came to this conclusion, and was able to convince the higher civilian authorities of its correctness, is certainly part of the Chemical Research Plan.

It is important for us to learn Iraq's CW doctrine because it signifies the intent of the CW program and therefore lays the basis for all subsequent activities required to acquire and use chemical weapons. It could be that there was no formal "doctrine" when the Iraq military began to experiment with chemicals, but some sort of understanding must have developed among higher echelon decision-makers in the early 1980s about military requirements (why were chemical weapons required) and applications (what kind of weapons would fulfill the requirements). It is reasonable to assume that this understanding developed as the 1980-1988 Iran-Iraq War intensified, and developed still further as the doctrine came to encompass internal enemies. Since a doctrine is the basis for all activities related to the acquisition of chemical weapons, identifying that doctrine and observing its evolution is one of our a primary research goal.

In particular, the three elements that constitute the chemical weapons acquisition process and thus bear on required capabilities – human resources, equipment and supplies, and facilities – are targets of the Chemical Research Plan, as well as an understanding of how and why chemical weapons were used against external and internal enemies.

2. Learning about Iraq's Human Resources Dedicated to CW

In order to acquire an indigenous CW capability, Iraq would in the first instance require the scientific and technical expertise to research and develop (R&D) the four components that constitute chemical weapons – CW agents, formulations, munitions and storage tanks, and dispersal mechanisms. (The effective military application of chemical weapons is a different capability, which is discussed below.) Such expertise resides in chemical scientists, chemical and weapons engineers, and technicians that supported chemists and engineers. There is very little information in the literature about the Iraqi scientists and engineers who planned, developed, and operated Iraq's CW program. Even with complete access to UNSCOM, the UN Monitoring, Verification and Inspection Commission (UNMOVIC), and Iraq Study Group (ISG) reports and inspectors, we have learned little in the unclassified environment about how the Iraqi government went about recruiting the chemical scientists and engineers it needed; nothing is

known about its reward system for these experts; nor is anything known about what happened to these experts after the spring of 2001. For example, we know nothing about the ethos that combines the two elements of both fear and cooptation that is discussed in the CNS's first deliverable. It is reasonable to assume that chemical scientists and engineers were enticed (*targhib*) to work for the CW program, but the enticements are not known. Similarly, it could be that they were intimidated (*tarhib*) to perform this work, and if so, nothing is known about intimidation methods in these cases. As these two notions capture the means and methods by which Saddam Hussein assured the survival of his leadership from 1979 to 2003, it is important to determine how they worked in the chemical sciences and engineering dedicated to CW.

3. Equipment and Supplies Required to Operate a Substantial BW Program

Unlike the situation regarding Human Resources, there is much information about how Iraq went about procuring the equipment and supplies it needed in order to be able to research, develop, test, and manufacture CW agents. The elaborate, secret acquisition effort to purchase dual-use equipment and supplies from industries in industrialized countries, as well as some developing countries that possessed specialized skills such as India, has been revealed to a large extent, and its success has been well analyzed. We propose to spend relatively little effort in this area of investigation, focusing that effort, instead, to fill some gaps in our knowledge about Iraq's secret dealings with less well known suppliers located in, for example, Egypt, the USSR, North Korea, China, and other as yet unknown entities. Further to this effort, it may be possible to find out whether Iraq helped Syria acquire a CW capability and/or chemical weapons.

4. Facilities Required to House or Hide Components of the CW Program

Similar to Equipment and Supplies, there is much open information about Iraq's CW facilities, including their locations, manufacturing methods, products, the quantity of products manufactured, deliveries of products to the military, and their usage against external and internal enemies. Therefore, we envision spending little effort on investigating CW-related facilities except, perhaps, those that were established by internal non-governmental organizations and industries operating at the edge of lawlessness after Saddam's government collapsed.

5. Use of Chemical Weapons

Iraq used chemical weapons against Iran and its own Kurdish and Shi'a populations. There are hundreds of publications that deal with both CW during the Iran-Iraq War and chemical terrorism against the Kurds and, to a lesser extent Shi'as, so it is not necessary for us to either review or repeat that history. Rather, the questions we will seek to answer are: What can we gain from having access to information in the CRRC records and tapes that casts new light on the Iran-Iraq War and the conflicts with Kurds and Shi'as, and/or provides new information on decision-making within the Saddam regime on chemical matters and uses? However, since the intentions for the use of chemical weapons had two different aspects – the first dealing with classical military usage, while the second is usage for state terrorism against Iraqis – they are dealt with separately.

i. Chemical weapons against Iran

The Chemical Research Plan envisions that we spend much of our effort on finding information in the documents and audio recordings that cast more light than is now available on the nature of civil-military relations during the Saddam era, the activities of various units within the Iraqi military that deployed and used chemical weapons, including how the performance of Iranian units was affected by chemical weapons used against them by Iraq during the Iran-Iraq War. The most important information we would be seeking is in regard to how the command structure functioned with respect to chemical weapons usage in the field. Though it is well known that Saddam himself, made both tactical and strategic decisions on chemical weapons usage by even the smallest military unit, we do not know to what extent he asked for and was given advice on technical matters, such as field conditions, meteorological conditions, enemy chemical defenses, and alternative approaches to achieving especially important tactical objectives. In general, it is not known why Saddam chose to become so intimately involved with tactical decision-making, so perhaps captured documents and audio recordings will provide more than clues on this matter.

On a related matter, little is known about the performance of Iraqi troops that were targets of Iranian chemical weapons in the latter part of the Iran-Iraq War, including how Iraqi troops defended themselves against Iranian chemical weapons. This being so, we expect to look for information that informs us about, among other issues, the training Iraqi soldiers received on protection against chemical weapons, including detectors and other warning systems, personal protective gear (e.g., masks), medical countermeasures, decontamination, and performance when subjected to CW.

ii. Chemical weapons against internal enemies

There was wide-spread, horrific use of chemical weapons by the Iraqi military against the Kurdish population and, perhaps, Shi'a Arabs populating the swamps and other territories in southern Iraq. Although it is widely hypothesized that Saddam ordered the use of chemical weapons against perceived internal enemies to either terrorize or punish them for subversive activities, such as seeking independence, collaborating with Iran, trying to overthrow the Saddam regime, or other anti-government actions, the decision-making process that resulted in the internal use of chemical weapons is not known. The Chemical Research Plan envisions that we spend a moderate amount of effort on uncovering information that will provide us with the ability to undertake in depth analysis of Iraqi use of chemical weapons, including determining how and on what basis decisions to do so were made, how chemical agents were selected, the limitations, if any, on their use, the rewards given to those who were especially ardent users of chemical weapons (we already know that a special reward system existed but do not know on what basis rewards were made), and whether chemical weapons usage was successful from the viewpoint of Saddam Hussein.

II. Technical Barriers to the Carrying Out of the Chemical Research Plan and Possible Means for Overcoming Them

The major barrier that has prevented us from carrying the Chemical Research Plan forward more rapidly has been the unavailability of relevant documents and audio recordings at the CRRC. There are two interconnected reasons for this situation. First, to date documents and recordings have been translated from Arabic to English and then reviewed by CRRC staff to redact sensitive technical and personal data at a rather slow pace. Thus by May 2012, only about 850 documents containing more than 31,000 pages were available to us for data mining, a small fraction of the overall source documents in the CRRC collection. (See Annex 1). A considerably larger number have been translated, but have not undergone sensitivity review.

Second, of the documents and recordings that have been translated and vetted for sensitivity, only a small proportion addresses CW-related subjects and issues. When these few thousand sources are data mined using the search terms we have developed, only a comparatively small number of hits was recorded. For example, when using the very general search term “chemical,” only 261 hits were recorded. However, by far most of these hits were documents that dealt with Iraqi government relations with UNSCOM and UNMOVIC, which are not of direct interest to our Chemical Research Plan. Thus, of the 261, only 16 hits were relevant to the Chemical Research Plan because they were related to the more specific search term “chemical weapon.”

A similar situation exists regarding audio recordings. Some audio recordings have been transcribed and translated by the CRRC previous to our data mining attempts and have been put to good use by three editors who collated and annotated them in a book.¹ A few of these provide information that is important to both our biological and chemical weapon research plans. For example, one recording contains a discussion between Saddam Hussein and several high ranking generals about targeting Iraq’s biological and chemical weapons on sites and population centers in Saudi Arabia, Israel, and elsewhere. This information is entirely new. From the small sample of transcribed recordings reproduced in the Woods et al. book, it is reasonable to believe that a substantial trove of policy-related discussion bearing on Iraq’s BW and CW programs, the use of biological and chemical weapons, and their ultimate disposition will be found in the not as yet translated or in translated but not yet released audio recordings.

III. Overcoming Technical Barriers to Implementing the Chemical Research Plan

Having described the barriers to our work, we next present ideas on how to overcome them. In the main, we propose two approaches: (1) assisting CRRC in directing future translation efforts so that they target documents that were issued by Iraqi agencies that were most heavily involved with CW issues, and (2) assisting CRRC in identifying translated Iraqi documents that should be targeted for earliest declassification so that we can use them for the research and analysis we conduct for our Minerva project.

¹ Kevin M. Woods, David D. Palkki, and Mark E. Stout (eds.), *The Saddam Tapes: The Inner Workings of a Tyrant's Regime 1978-2001*, (New York: Cambridge University Press, 2011).

The first approach should, with the help of CRRC's staff members, be relatively easily accomplished. From our research efforts to date, it appears that most of the documents that bear on CW issues were written by persons who worked for the following agencies (see Annex 1), which are listed here in order of importance to us: the Military Industrial Commission (MICN),² the Ministry of Defense (MODX), the General Military Intelligence Directorate (GMID), the Armed Forces General Command (AFGC), the Army (IZAR), and the Ministry of Foreign Affairs (IMFA). Thus we encourage the CRRC to focus its translation efforts on documents issued by these agencies.

The second approach is one that further narrows the focus of the first approach. One of the CNS research staff, Dr. Raymond Zilinskas, had a Secret clearance with the NDU until July 27, 2012. This clearance was transferred to the CRRC in April 2012, which allowed him access to all the captured Iraqi documents in the CRRC's collection that are classified. However, since Zilinskas does not speak Arabic, de facto he had access to only the documents that had been translated but were awaiting sensitivity review before being released. Nevertheless, in May 2012, when Zilinskas spent four days at the CRRC, he observed that *approximately 300,000* documents had been translated. Recall that in March 2012 (see above), Zilinskas had searched the 850 documents that were cleared for general release and had come up with 261 hits on the term "chemical" and 16 hits on the term "chemical weapon." However, in May when he data mined the much larger number of classified documents, his results were astounding: over 16,000 hits on "chemical" and over 9,000 hits on "chemical weapon."

In order for a document to be useful for the CNS research effort, it has to be cleared for general release by an appropriate agency, which at this time appears to be National Defense University's (NDU's) Center for the Study of Weapons of Mass Destruction (CSWMD). Clearing a document for general release involves having an expert on chemical warfare and weapons read a document and ascertain that it does not contain information that if released, might harm U.S. security or be hazardous to any person or persons. The rule is based on the appreciation that when dealing with captured Iraqi documents, two kinds of information should not be released. First, information that describes methods that an entity could use to develop chemical weapons or improve on existing chemical weapons must remain classified. Second, the names of private persons and companies that worked for the Iraqi CW program, supplied equipment and supplies to it, used chemical weapons, or provided information about CW-related activities to the United States or its allies should not be publicized, because these individuals might be targeted for retribution, kidnapping, or otherwise face hazards. (If documents were found that revealed criminal activity by individuals, those, presumably, would be turned over to proper authorities.)

With its limited human resources, it would unreasonable for us to request the CSWMD to clear the 9,000 documents that might contain information of interest to us. In other words, we would need to prioritize; i.e., identify the documents that would be highly likely to lead us to being able to achieve the objectives of our Chemical Research Plan and request that these be declassified with all possible haste.

² We use the same acronyms as does the CRRC; see Annex 1.

Accordingly, the second approach necessitates that Dr. Zilinskas review the approximately 9,000 documents for the purpose of identifying those that contain the information we need. Dr. Zilinskas started doing so during his stay at the CRRC in May 2012 and was able to identify about 400 documents that appeared, after his very quick review performed over a two-day period, to contain information of interest. Of these, he reviewed approximately 30 documents more intensively and noted information of definite interest. We provide examples of this information in Annex 2.

For technical reasons, involving the end of Dr. Zilinskas's consulting arrangement with the Department of State, his Secret clearance was terminated on July 27, 2012. In order to continue working the second approach – review of classified documents to accelerate sensitivity reviews and release – we will request the Army Research Office to take the necessary steps to secure a Secret clearance for Dr. Zilinskas as soon as possible.

Once the clearance has been secured, Dr. Zilinskas will spend substantial time at the CRRC to review the as yet classified translated Iraqi documents and audio files using the specific search terms that we have developed for the Chemical Research Plan. We are certain that by following this approach, and as demonstrated by the information in Annex 2, a substantial amount of new information will be collected that will enable us to fulfil the Chemical Research Plan.

It bears noting that CNS research staff has discussed another activity with CRRC that would be an off-shoot of the second approach. It would involve Dr. Zilinskas writing a research paper to fulfil the Chemical Research Plan using information taken from still classified documents. The research paper would perforce be classified, but would be submitted to the CSWMD for review and, if it agreed, to declassification. Since this paper would be mainly policy-related, it probably would not raise concerns about revealing methods or names.

Annex 1: Iraqi Saddam Hussein (SH) Collection Overview as of May, 2012

Category	# of Records in Section	# of Pages in Section
Ba'ath Party Correspondence (BATH)	36	1107
Fedayeen Saddam (FSDM)	13	257
Air and Air Defense Force (AADF)	16	760
Al-Quds Army (QDSA)	5	165
Armed Forces General Command (AFGC)	8	505
Army (IZAR)	55	2308
Directorate of General Security (IDGS)	31	1,232
General Military Intelligence Directorate (GMID)	144	4533
Intelligence Service (IISX)	68	1748
Military Industrialization Commission (MICN)	11	239
Ministry of Defense (MODX)	18	838
Ministry of Foreign Affairs (IMFA)	14	361
National Monitoring Directorate (INMD)	1	6
Navy (IZNA)	1	6
Republican Guard (RPGD)	20	800
Revolutionary Command Council (RVCC)	17	380
Special Security Organization (SSOX)	5	67
Saddam Regime Miscellaneous (MISC)	97	3,342
Saddam Tapes (audio files) (SHTP)	158	9,008
Saddam's Personal & Political Correspondence (SPPC)	47	1143
Saddam Presidential Diwan (PDWN)	98	3640
Total	850	> 31,000

Annex 2: Five Examples of New Findings from Review of Translated but Still Classified Saddam Hussein Documents during May 7, 8, and 11, 2012

Example 1 is a Top Secret Military Industrialization Commission (MICN) document dated September 18, 1985, that contains an assessment performed by Rihab Rashid Taha, Nasir Husayn Al-Hindawi, and Kamil Muhammed Abd-al-Majid. The three signatories were the top Iraqi biological warfare (BW) scientists, whose names have been widely publicized in previously released official documents and published research.

The assessment was done to determine the requirements for the mass production of biological agents A (code-letter for botulinum toxin) and B (code-letter for *Bacillus anthracis*) at the Department of Criminal Research/Biological Research. The authors note that the current biological production of these agents is a mere 30 liters every 5 days. To scale up to mass production, the authors estimate that three 5,000 liter fermenters will be needed; two for the production of A and one for B, as well as necessary attachments. However, the authors also noted that MICN experts have examined the fermenter situation and found that only the fermenter body, which constitutes only 10% of a fermenter, could be manufactured in Iraq, so 90% of the parts that constitute a fermenter would have to be purchased from foreign suppliers such as a named firm in Switzerland and a second named firm in Czechoslovakia.

Example 2 is a Top Secret letter with the heading “Action of Research” and dated September 17, 1988, which was sent by Taha Ibrahim Al-Abdallah, Presidential Diwan, to the Ministry of Defense, Ministry of Foreign Affairs, Ministry of Interior, Ministry of Information and Culture, Minister of Higher Education and Scientific Research, Minister of Education, Minister of Industry and Military Industrialization, Scientific Research Council, and Atomic Energy Organization (in Arabic).

The letter has four sections. The first asserts that the “Zionist regime,” the usual term for Israel that is found in Iraqi official correspondence, has chemical and biological weapons of various types in large quantities, which pose a threat to Iraq. In view of this threat, the letter continues, it is necessary for Iraq to learn more about Israel’s biological and chemical weapons program so that Iraq can improve the training of Iraqi troops and take the necessary measures to protect civilians.

The second section explains the need of Iraq to identify domestic military and civilian targets that are vital to the country and prioritize them according to their importance. After this has been done, the letter states, methods need to be worked out to protect targets, so as to guarantee that the targets are invulnerable to chemical or biological attack.

The third section deals with methods needed to meet the threat from Israeli CW to Iraq’s population by means of civil defense.

The fourth section asserts that the most effective defense against Israeli chemical and biological weapons is “deterrence.” To achieve effective deterrence, the letter then lists four specific steps Iraq needs to take.

Example 3 is a Top Secret “Annual Report: Meeting Minutes Correspondence Pertaining to the Technical Researches Center in Regards to Each Working Section,” dated October 16, 1990. This report is highly technical and rather long (49 pages), so only a few parts of it that deal with heretofore unknown details of the Technical Research Center (TRC), which developed both chemical and biological weapons, are described here. The report is signed by high officials, including Imad Muhammad Dhiyab (director of TRC), Rihab Rashid Taha (BW scientist at TRC), and Muhammad Faraj Bilal (director of the Al-Muthanna General Establishment).³

The annual meeting that this report discusses spent much time on establishing specifications for chemical and biological “substances,” the types of munitions that would be used to disperse them, various formulations of the chemical and biological agents, fatal doses for each, and arrangements for storing loaded munitions to reduce the deterioration of their contents.

An addendum to the annual report, dated October 24, 1990, discusses open air experiments to confirm fatal doses. The documents go into considerable detail on these matters.

Example 5 is a document comprised of handwritten notes in Arabic and is titled “MIC’s Involvement in WMD Programs” and dated March 2004. It has two main sections – a list of MICN divisions and a list of secret sites for storing chemical and biological weapons, including a number of civilian airports. Many entries on both lists have never been previously disclosed.

³ The Muthanna State Establishment developed both chemical and biological weapons and had a large open-air test site for realistically testing them.

Annex III: Chronology of Iraq's Chemical Weapons Production Activities (1931 – 1998)

The most complete description to date of Iraq's chemical weapons activities can be found in a Compendium written by experts employed by the United Nations Monitoring, Verification and Inspection Commission (UNMOVIC) and published in 2007. This Chronology is developed from data presented in the Compendium's Chapter III, which addresses Iraq's chemical weapons activities.¹

1931	Iraq ratifies the 1925 Geneva Protocol on the Prohibition on the Use in War of Asphyxiating, Poisonous and Other Gases, and of Bacteriological Methods of Warfare.
1960s (?)	The Chemical Corps is formed within Iraq's Armed Forces.
1971	The Chemical Corps establishes a chemical laboratory complex at Al Rashad village in the north-eastern part of Baghdad.
1971-1974	Al Rashad laboratory has four sections that worked on nerve agents, blister agents, irritants, and defoliants.
1971	Intense research and familiarization with CS begins at Al Rashad. This lays the basis for staff to work with more toxic chemicals.
1974	The Al Hazen Ibn Al Haitham Institute is established to conduct applied research in chemistry, physics, and microbiology. It is officially attached to the Ministry of Higher Education and Scientific Research but is secretly affiliated with the State Security Apparatus. ²
1974	During 1974, the Al Hazen Institute is organized into three centers, with the First Centre being responsible for CW-related activities. It is headquartered at Al Rashad and takes over its laboratories. (The Second Centre, named Ibn Sina Centre, conducts biological research.)
1974	Pilot plant production of CS begins at Al Rashad.
1975	The four laboratories at Al Rashad are upgraded by, among others, being equipped with fume hoods and "several" rotary evaporation units with 500 ml capacity.
1975	Al Hazen Institute establishes new site south of Samarra city. Four CW production plants are built: P-8 for mustard; P-7 for tabun and sarin; and Ahmed 2 & 3 for production of precursors for tabun and sarin. The general contractor is Al Fao General Establishment that is affiliated with State Organization for Technical Industries (SOTI).
1975	Al Hazen Institute was producing laboratory quantities of mustard, tabun, and sarin.
"mid-1970s"	Al Hazen Institute has by this time set up contacts with "30 major foreign organizations and companies" for securing precursor chemicals, pilot-scale and industrial size processing equipment for Iraq's future large CW program.
1976	Al Hazen Institute secures pilot scale reactors and vessels in preparation for large-scale product of CW agents. This includes 200 liter pilot-scale glass reactors and 3 m ³ Hastalloy lined vessels.
1978	Al Hazen Institute is abolished and some of its staff is imprisoned for "scientific

	fraud.” Its assets are transferred to SOTI and its equipment to other organizations. Although abolished, its CW functions continued at other “organizational structures.”
1979	The Al Rashad facility is returned to the Chemical Corps.
1979	The role of the Chemical Corps for NBC protection is expanded. For this purpose, the Central Military Medical Laboratory is established and is under the authority of the Military Affairs Directorate of the Administration of Provisions Department of the Ministry of Defense.
1979-1981	SOTI undertakes some civil construction and development at the former Al Hazen Institute site under Project 1-75.
1979-1981	Iraqi intelligence agencies expand their efforts to collect information on CW know-how and production technology.
1980-1981	Chemical Corps accepts the method for synthesis of mustard from thiodiglycol for industrial scale production.
1980-1990	The Iraqi Intelligence Service’s (IIS or <i>Mukhabarat</i>) M9 Directorate of Communications developed chemical and biological weapons, produced toxins, poisons, and lethal devices for intelligence or assassination operations, and tested its products on prisoners.
September 22, 1980	Iraq invades Iran and thus starts the First Persian Gulf War.
September 1980	The IIS sets up M9/J, a subordinate section headed by Dr. Muhammad ‘Abd-al-Mun’im Al Azmirli, for the purpose of developing chemical and biological weapons. Prisoners from the Al Hakamiyah Prison were used to test M9/J’s products.
1981-1982	The Al Rashad laboratory is closed down. By this time, it was producing a “few hundred” kilograms (kg) of mustard agent per day that was used against Iran.
June 1981	Iraq recognizes its significant manpower disadvantage in fighting Iran and decides to mitigate this disadvantage by producing and deploying chemical weapons. For this purpose, it sets up Project 922 within the Ministry of Defense. The Commander of the Chemical Corps is appointed the head of Project 922.
1981-1983	Project 922 is capable of producing “hundreds of kilograms per day” of mustard, which is “far less than the military requirements and expectations.”
August 1981	To substantially increase its CW agent production capabilities, the Revolutionary Command Council (RCC) of Iraq issues a decree for establishing the State Establishment of Pesticide Production (SEPP), which is a cover name for a vastly increased CW program. SEPP reports to the Ministry of Defense on CW issues and Ministry of Industry and Minerals on commercial products.
September 1981	SEPP resumes construction of the four production plants operated by the Al Hazen Institute at the Samarra site. In addition, a large administrative complex and air conditioned bunkers for storing chemical weapons and agents are constructed.

Undefined dates in 1981	CS in both liquid and powder form is developed and tested at SEPP/MSE using mortar shells, RPGs, and aerial bombs. Al Qaa Qaa facility produced smoke canisters and rockets.
1981-1983	Eight reinforced concrete bunkers with air conditioning and temperature control are constructed on the Samarra site to store chemicals and chemical weapons. The “real” storage bunkers are surrounded by six dummy bunkers to fool enemy bombers.
1982-1984	SEPP contracts a “foreign” company to design and equip five research laboratories that was to perform chemical synthesis, toxicological evaluations, and quality control. An inhalation chamber was installed in one of the buildings designed as a pilot plant. Its main function was to perform toxicological evaluations of CW agents. For this purpose, an animal house was also constructed.
1982	Iraqi declarations claim that tabun was first produced in laboratory quantities by Iraqi scientists in 1982.
1982	SEPP/MSE collaborated with the Technical Research Centre (TRC) at Salman Pak to study the effects of mixing CS with biological agents, particularly aflatoxin. This did not lead to weaponization.
Summer 1983	Most of the CW plants and facilities at Samarra are operational.
1983	Mustard was being produced on a large scale at the P-8 Plant (Bin Hayan Plant after 1987) from 1983 to 1988 and from 1990 until January 1991. Its maximum production capability was 8 tons of mustard daily. Estimated total production for the year was 150 tons.
1983	Biological weapons development added to Project 922.
1983	First use of mustard against Iranian troops is reported in the news media.
1983	There were two so-called Multipurpose Precursor Plants named Ahmed 1 and Ahmed 2 (combined as Mutassim 2 after 1987). They produced precursors for tabun and sarin, including D4, MPC, MPF, and DMMP at a maximum rate of two tons per day during 1983-1987.
1983	Three identical pilot production plants were designed to help in the development of processes to produce indigenous precursors for tabun and sarin production. In 1983, two of these pilot plants, called H1 and H2, became operational, while H3 came on line in 1985. After 1987, the three were combined under one name – Mutassim 1. These pilot plants produced D1, DMMP, and MPC at a rate of 500 kg per day.
1983	Sometime during 1983, Iraq imported 10 prototypes of binary chemical artillery shells and began its own research on binary systems. In view of negative results, this effort was cancelled.
1983-1984	SEPP/MSE undertook large scale production of crystalline CS as part of the Ghazi Project.
1984	Iraq imports 4,000 tons of PCl_3 , but which is not used until 1987.
1984	The first use of tabun against Iranian troops is reported in the news media.

1984	The P-7 Plant (Mutassim 4 after 1987) became operational in 1984. Sarin was produced in 1984, 1985, and 1988, as well as from 1990 to January 1991. Production rates are not known. Tabun was produced in 1984 at the rate of 320 liters per day; total production was 30-40 tons.
1984	SEPP purchased an alcohol distillation plant from a foreign company to enable it to produce indigenous absolute alcohol for the production of tabun at P-7. The plant's capacity was 15 liters of alcohol per hour.
1984	Iraqi scientists are known to have first investigating VX in 1984. Soon several research teams were involved in this effort.
March 1984	Inspectors sent by the UN Secretary-General to investigate allegations by Iran that CW was being used against it are provided with a sample of liquid that contains tabun.
1985	According to a later UNMOVIC assessment, by 1985 SEPP "was able to produce up to several tons of both nerve and blister CW agents per day." ³
1985	In 1982, construction began on yet another chemical production plant for precursors and, should the need arrive, CW agents. This plant, called the Mohammed Plant (Mutassim 3 after 1987), began producing the tabun precursor D4 at the rate of 1.5 tons per day in 1985, and in 1988 produced the sarin precursor MPC.
1985	In addition to developing the Samarra site, SEPP founded three additional facilities called Fallujah 1, 2, and 3. These identical facilities were located about 20 kilometers north of Fallujah city and were designated as "multipurpose plants," which meant that they could produce raw materials and precursors for the manufacture of CW agents chemical weapons when necessary, but also chemicals for peaceful industrial purposes such as pesticides.
1986	An aerial bomb production workshop called "Nasser Factory" was built by SEPP on the Samarra site and became operational in 1986. It was designed to manufacture low drag, general purpose bombs that could be easily modified for filling with CW agents.
1986	The so-called Malik Multipurpose Plant (Bin Hayan 2 after 1987) was built to produce sarin precursors. However, when it became operational in 1986, it was ordered to produce tabun. In 1987, it began to produce precursors for sarin, including DMMP and MPC, as well as the VX precursors diisopropylaminoethanol and MPS. In 1988, an attempt to produce VX at this plant failed.
1986	Iraq stops production of tabun in favor of increasing its efforts to produce sarin and cyclosarin.
1987	In 1987, SEPP was renamed the Muthanna State Establishment (MSE) and placed under the authority of the newly established Military Industrialization Commission (MIC).
1987	Iraq declared that a short project was carried out at an unspecified site to produce distilled Lewisite. No stockpiles of this agent has been found, nor anything more than small quantities of its precursors.

1987	Towards the end of 1987, MSE is ordered to advance VX production to an industrial level and to undertake field trials with this agent using 500 gauge aerial bombs and a 122 mm rocket. An eight month long trial was carried at the Muthanna Research and Development Directorate with mostly successful results.
December 1987	An attempt was made to produce VX at the P-8 Plant, but it was found unsuitable for this purpose, so the idea was dropped. (Another report contradicts this last statement, asserting that 1.5 tons of VX was produced in 1988 at the “MP-8” Plant.)
1987-1988	Iraqi scientists discovered that a sarin analog called cyclosarin is more toxic than sarin itself and has other properties useful for CW. Moreover, it was found that the same production line could be used to produce sarin and cyclosarin.
1988	In 1983, SEPP decided to build another plant in addition to P-7 for the production of nerve agents. It was designed and equipped by a foreign company, but in the process it became suspicious and withdrew from the project. The Iraqis were forced to finish constructing this plant, called the Dhia Plant (Bin Hayan 3 after 1987), so became operational only in 1988. In the first half of 1988, it produced the precursor MPS and about 3.2 tons of VX.
1988	Construction of the Ahmed 3 Plant (Mutassim 2 after 1987) began in 1987 and it became operational in 1988, Its main purpose was to produce precursors MPC and PCl_3 .
1988	Mutassim 1 began to produce sarin and cyclosarin, in addition to the precursor MPF, in 1988.
1988	Iraq restarted its research on binary systems using 155 mm extended range artillery shells. A firing test utilizing 120 shells was deemed successful. However, for unknown reasons there was no attempt by the Iraqis to manufacture binary systems.
1988	The Al Mamun Plant was constructed on the grounds of Fallujah 2 for the specific purpose of manufacturing thionyl chloride that, in turn, was used to manufacture MPC and mustard agent. The Al Qaa Qaa State Establishment provided sulfur trioxide to Al Mamun, which was a precursor to thionyl chloride. During 1988-1989, Al Mamun produced 70 tons of thionyl chloride.
August 1988	MSE stops CW agent production and instead focuses on research.
August 8, 1988	Iraq and Iran agree to a cease fire.
1989	The DMPH Plant was built within the Ahmed 3 Plant and its main purpose was to produce sarin precursor DMPH from PCl_3 . It reports producing 75 tons of DMPH during 1989-January 1991.
1989	Industrial level production of botulinum toxin commences at Al Hakam.
1990	MSE produces two tons of CS. Iraq’s declared total production of CS by end of 1990 was 12.5 tons, which was considered by UNSCOM as grossly under-reported. (In 1997, Iraq declared its total production to have been 40 tons.)
1990	The IIS removes M9/J from M9 and assigns its own directorate, M16. During its

	existence it had two directors; 'Amir 'Awni Juma'a (1991-1996) and Nu'man 'Ali Muhammad Al Tikriti (1996-2003).
April 1990	Manufacture of Al Husayn special chemical warheads commences.
June 1990	The filling of Al Husayn special warheads and R-400 bombs with CW agents commences at MSE.
August 1, 1990	Iraq deploys chemical weapons at several sites in Iraq in preparation for the invasion of Kuwait.
August 2, 1990	Iraq invades Kuwait.
November 1990	According to Iraq's later declarations, the conversion of Mirage F-1 drop tank from CW to BW applications began this month.
1991	After 1991, the RCC had no collective decision-making about retention or development of WMD.
1991	The Al Tahadi Plant was built at the Muthanna State Establishment for the purpose of producing precursors but was not completed prior to the 1991 Gulf War.
1991	SEPP decided to ensure an indigenous supply of PCl_3 and POCl_3 by contracting a foreign company to design and equip the so-called A+B Plant, which was to be built at Fallujah 2. Its designed production capacity of PCl_3 was 17 tons per day, but this was never achieved since the 1991 Gulf War interceded.
1991	Similar to the A+B Plant, a foreign company was contracted to design a TMP production plant, which was to be built at Fallujah 2. The TMP Plant was not finished before the 1991 Gulf War.
1991	A chlorine production plant was to be built at Fallujah 2 and its purpose was to produce chlorine for both commercial purposes (detergents and disinfectants) and CW purposes (precursors such as PCl_3 and thionyl chloride). This plant was not finished before the 1991 Gulf War. However, since it had never been used for CW purposes, it survived and became operational in 2002.
January 15, 1991	MIC orders the evacuation to of all chemical and biological weapons to safe storage sites.
January 17, 1991	Desert Storm commences.
February 28, 1991	Desert Storm ends with Iraq's capitulation.
March 1991	Iraqi forces use bombs filled with CS and nerve agents on Shi'a in Najaf and Karbala (nerve agent bombs fail to operate).
Summer 1991	Iraq unilaterally destroys 125 type aerial bombs filled with CS at Airfield 37.
June 1991	Saddam established the Higher Committee following Desert Storm to manage Iraq's relationship with the UN on WMD disarmament.
July 1991	Husayn Kamil masterminded the undeclared destruction of large stocks of WMD.
June 9, 1991	The first UNSCOM CW inspection takes place at MSE (U-2, CW-1).

Mid-July 1991	According to subsequent Iraqi claims, chemical and biological weapons are unilaterally destroyed.
September 1991-1994	UNSCOM begins destruction of declared chemical weapons and agent, which continues until July 1994.
June 1992	Iraq submits its first FFCD for CW.
July 1992	UNSCOM begins the process to destroy CW facilities.
October 20, 1993	Former CW facilities are split from the National Company for Agricultural Chemicals and Medicines.
June 1, 1994	UNSCOM completes destruction of known CW agents and production facilities.
1996	Industrial Committee begins work, has responsibility for coordinating indigenous chemical industry.
October 1997	UNSCOM destroys chemical process equipment purchased before 1991 for CW program.
April 1998	VX detected on missile warhead fragments.
December 1998	UNSCOM withdraws its staff from Iraq.

Figure XX: Declared Production of CW Agents by SEPP and MSE (in metric tons)⁴

	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990
Mustard	10	75	150	240	350	350	899	494		280
Tabun				60	70	80				
Sarin				5	30	40	209	394		117
VX								2.4		1.5

Total CW agents (does not include riot control agents): 3,859 tons

Endnotes

¹ United Nations Monitoring, Verification and Inspection Commission, *Compendium of Iraq's Proscribed Weapons Programs in the Chemical, Biological and Missile Areas*, "The Chemical Weapons Program," (United Nations, June 2007), pp. 47-343.

² Iraq officials told UNSCOM that the establishment of the Al Hazen Institute was considered "as the foundation of Iraq's offensive CW program" (Ibid, p. 53).

³ Ibid, p. 63.

⁴ Ibid, p. 76.