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Impact and Implications of Chemical Weapons Use in the Iran-Iraq War

Interagency Intelligence Memorandum

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NI IIM 88-10004C

IMPACT AND IMPLICATIONS OF CHEMICAL WEAPONS USE IN THE IRAN-IRAQ WAR [redacted]

Information available as of 20 March 1988 was used in the preparation of this Memorandum, which was approved for publication on 22 March 1988 by the Acting Chairman of the National Intelligence Council.

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CONTENTS

KEY JUDGMENTS

Chemical weapons and riot control agents have been part of the Iran-Iraq war since the early 1980s. Chemical weapons have become a regular and recurring tactic in the conflict and are likely to increase. We believe both states have assessed that selective use of chemical weapons can augment conventional arsenals, attain short-term objectives, influence certain combat situations, and significantly increase enemy casualties.

Baghdad and Tehran apparently believe that chemical weapons have been tactically effective or even decisive in a limited context, but chemical warfare has not provided a strategic alternative or advantage. As long as Iran and Iraq continue to employ chemicals primarily in a defensive role, neither nation will gain a strategic advantage based purely on the use of chemical weapons.

Iraq has employed such weapons—primarily in response to Iranian offensive actions—since August 1983, and on 17 March 1984 the nerve agent tabun was used for the first time ever on the battlefield. The Iraqis have adopted a dry/dusty form of mustard that affects personnel rapidly and can penetrate the NATO-type semipermeable chemical suit.

Iran used chemical weapons on a very limited scale beginning in 1985, probably for testing or training. Since April 1987, Iran has launched several small-scale chemical attacks with mustard and an unidentified agent that causes lung irritation.

Although estimates of chemical casualty rates are uncertain, in one campaign they were reported to be as high as 30 percent—of which 3 to 4 percent were fatalities.

As more nations acquire a chemical capability, military and peacekeeping forces must expect the threat of either intentional or inadvertent exposure to chemical attack in any regional conflict of the future. The use of standard agents and agents in different forms creates unexpected vulnerabilities.

The Intelligence Community believes that Third World countries perceive that successful chemical weapons use on the battlefield and the lack of meaningful international sanctions or condemnations suggest that they can acquire a chemical weapons capability as a deterrent or military force multiplier without fear of repercussions.

Foreign assistance has been pivotal in the development and expansion of the Iranian and Iraqi chemical warfare programs. While Western export controls initially raised the cost and slowed the programs somewhat, both countries have become adept at circumventing these controls and altering the production processes. Their drive for an independent and indigenous chemical weapons production capability will make them less dependent on foreign support and less susceptible to external political pressures.

If the use of chemicals continues or increases, it would be an indication to Third World states that chemical weapons have military utility, and a worldwide chemical protocol or treaty could become more difficult to obtain.

We do not believe that nations which have recently acquired a chemical capability, or which perceive a threat and see chemicals as combating the threat, will willingly give up their new military tool—especially in areas of frequent conflict such as the Middle East and Asia.

DISCUSSION

1. This Memorandum examines the degree to which chemical warfare (CW) in the Iran-Iraq conflict has been effective and discusses the factors driving decisions to develop and use chemical weapons. It appears that chemical weapons have a role on the Middle Eastern battlefield, and the report addresses regional and international implications as well as political and military factors that could affect US interests.

2. Iran and Iraq have developed chemical weapons and have employed them in their conflict since the early 1980s. Iraq began to develop its CW capability in the early 1970s to counter a perceived Israeli CW threat, while Iran began its program as a response to Iraqi battlefield use. Baghdad used riot control agents (RCA)[1] in the mid-1970s against dissident Kurds in northern Iraq. Hostilities with Iran gave additional impetus to the Iraqi CW program in the early 1980s, and since 1983, Iraq has used chemical weapons every year in its war with Iran.

3. Overall, we believe the frequency of chemical weapons use, initially constrained by availability, has increased while the effectiveness of Baghdad's CW employment in major battles is improving. President Saddam Husayn's initial political and military decision to use chemical weapons against Iran seems to have been made in an effort to compensate for Iraq's limited military manpower pool. Iraq was able to use CW to minimize personnel and territorial losses by stalling or preventing Iranian human wave attacks and because Iran had only limited CW protective capabilities and could not retaliate in kind. Although Iraq has not achieved its strategic military and political goal of ending the war, CW has been a significant element in helping Iraq achieve its tactical battlefield objectives. In our judgment, the Iraqis perceive chemical weapons to be an effective complement to their conventional arsenal.

4. Iranian policymakers also have decided to employ chemical agents and in 1987 began limited battlefield use of chemical weapons. Tehran currently has a limited quantity of weaponized chemical agents. It will be at least a year before it can produce the quantities needed to affect significantly the land war in other than small-scale engagements. (See annexes A and B for a complete discussion of Iran's and Iraq's chemical warfare capabilities.)

Battlefield Use of Chemical Weapons

5. The approximately 230 reports of chemical attacks, mostly by Iraq, substantiate that CW has become a recurring event in the war. (See figure 1.) Although Iraq denies the use of chemical weapons, and contends that the 1925 Geneva Protocol (of which both Iraq and Iran are signatories) does not prohibit chemical weapon use on one's own territory, many of Iraq's chemical attacks have occurred in Iranian territory. In those attacks, chemical weapons have been used primarily in a defensive role[2] in response to major Iranian offensives and have involved a variety of delivery means. (See table 1.) Reporting indicates that Iranian rear area support troops occasionally sustain large numbers of casualties because they are less prepared and equipped to cope with chemical attacks. (See annex C.) In this regard, rear area chemical attacks may be a force multiplier for Iraq. There is evidence that Iraqi CW attacks may be evolving to include preemptive uses.[3] If Iran were to threaten Iraqi perceived strategic positions, we believe that Iraq might authorize massive chemical employments, as implied by Iraqi politicians. On the Iranian side, the use of chemical weapons has been insufficient to determine a pattern of employment or the overall military effectiveness. If the military objectives of Baghdad and Tehran are being assisted or accomplished by chemical weapons employment, it is unlikely either will forgo the chemical option in the future.

[1] The United States does not recognize riot control agents such as tear gas, CS, or CN as chemical warfare agents.

[2] Iraq has used both lethal and nonlethal chemical agents, primarily in defensive operations and counterattacks. It prefers to use the riot control agent CS when Iraqi troops are in proximity to Iranians. The goal of CS use by Baghdad is to force Iranian troops to don protective gear, thus hampering operations. Even if this does not halt an Iranian advance, it at least disrupts the Iranian offensive long enough to permit Iraqi troops to pull back—permitting the use of lethal chemical agents and causing Iranian casualties.

[3] Iraq used chemical weapons preemptively at least once. On 1 January 1987, Baghdad launched a chemical attack on Iranian troop concentrations preparing for offensive action in the central border region.

Figure 1
Chemical Warfare Attacks Along the Iran-Iraq Border, 1982-88

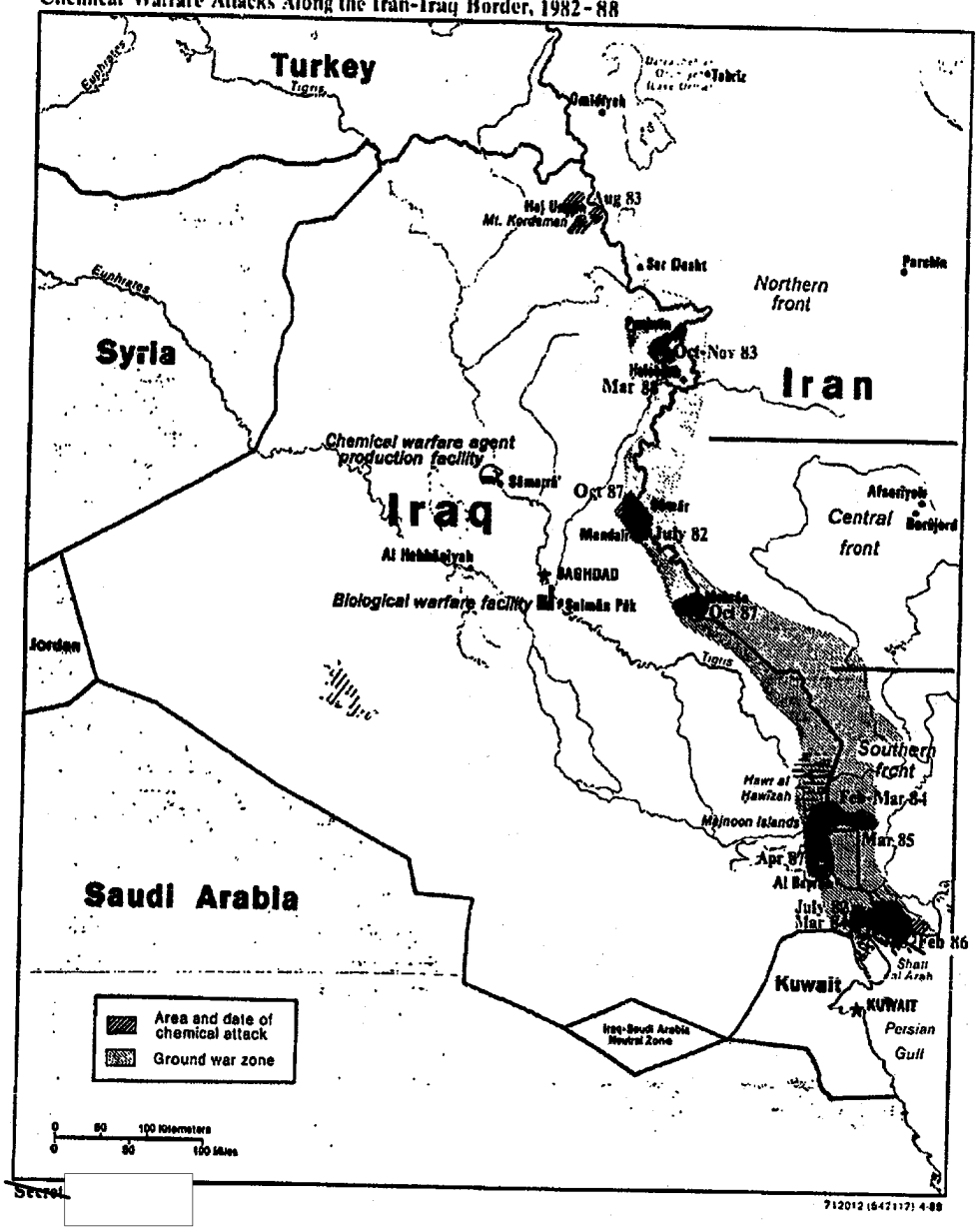

Table 1
Chemical Munition Delivery Systems [a]

	Agent	Delivery System
Iran		
Aerial ordnance		
250-kg bombs [b]	Mustard/cyanide	F-4 or F-5 aircraft
125-kg bombs	Mustard/cyanide (possible)	PC6 aircraft (possible)
Chemical canisters	Mustard	Unknown
Ground ordnance		
106-mm recoilless rifle	Unknown	
120-mm mortar	CS	Various mortar systems
130-mm artillery	Mustard	Various types of artillery pieces
155-mm artillery	Cyanogen chloride (possible) Phosgene (possible)	
Iraq		
Aerial ordnance		
250-kg bombs	Mustard/tabun	SU-22f
500-kg bombs	Tabun	MIG-23
90-mm rockets	Tabun	MI-8 Hip helicopter
Canisters	Mustard	Unknown
Ground ordnance		
82-mm mortars	CS/mustard	Various mortar systems
120-mm mortars	CS/mustard	
130-mm artillery	Mustard	Various artillery pieces with the Austrian GHN-45 howitzer being preferred.
152-mm artillery	CS	
155-mm artillery	Mustard	
122-mm rockets	Tabun/mustard	Multiple rocket launcher

[a] One ton of chemical agent can cover approximately one square mile.
[b] Chemical fill in 250-kg bombs has been estimated to be between 50- (GA) and 130- (HD) kg of agent. An 85-kg weight fill was chosen as an average based on Soviet munitions data.

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Iraq

6. Beginning in 1982 there were indications of RCA use by Iraq against Iranian forces. Since then, the types and lethality of chemicals used by Iraq has increased, from riot control agent CS to mustard agent in 1983 and to the first battlefield use of a nerve agent (tabun) against Iranian troop concentrations near the Majnoon Islands in March 1984. It appears that early attacks were limited to using a few artillery shells, mortar rounds, or aircraft-delivered munitions. Many types of CW agents and riot control agents are now being used on the battlefield (see inset).

7. Iraq appears to have become more competent in its capability to integrate chemicals into its conventional battle strategy. (See table 2 for examples of selected CW employments.) As chemical weapons have become more available and have been successfully employed, Iraqi political and military leaders appear to have accepted them as a tactically useful and effective weapon. We believe that chemical munitions, in a few cases, have been significant in the context of specific battles. For example, in the Karbala VIII campaign of April 1987 the use of chemical weapons, combined with conventional arms, proved effective.

Iraqi Use of Chemical Weapons Against the Kurds

Iraqi use of chemical weapons to subdue the Kurdish population inside Iraq, along the triborder area with Iran and Turkey, is qualitatively different from the use of chemicals against another country. The Iraqis have primarily used riot control agents and possibly, in some cases, chemical weapons against the Kurds to minimize the diversion of troops from more critical fronts and the losses that might occur in inaccessible areas that favor guerrilla forces. It is very difficult to determine the type of agents and the exact circumstances under which any of the agents may have been used.

Iraq used the riot control agent CS against the Kurds during the civil war of 1974-75. In mid-August 1981, the Iraqi military authorities became increasingly concerned about the deterioration of security conditions in Iraqi Kurdistan. As a result, military authorities decided to authorize the use of mustard agent against the Kurds. In late August, one and a half tons of mustard agent were transferred from a CW depot near Baghdad and distributed among Iraqi garrisons in northern Iraq. Orders were issued to initiate CW operations against the Kurds during September of that year.

The campaign against the Kurds once again intensified in early 1987 as Iraq attempted to secure the northern border areas with Turkey and Iran. Since April 1987, a military campaign has been waged to eradicate village bases of support for Kurdish guerrilla groups. To minimize losses of men and materiel, Iraqi troops have used riot control agents and possibly chemical weapons repeatedly when conventional weapons have not sufficed to subdue villagers before razing their dwellings.

Saddam Husayn reportedly gave the direction of this campaign to Ali Hassan al-Majid, director of internal security and Saddam's cousin, who devised a "scorched earth" policy to eliminate dissident Kurdish activity in northern Iraq. The policy, carried out between April and July 1987, and apparently resumed in October 1987, has spurred the desertion of many loyalist Kurds and private criticism from senior Iraqi Government and military figures. Even the figurehead vice president of Iraq, a Kurd, has refused to support the policy—a daring defiance of Saddam Husayn's authority.

The types and lethality of chemical weapons available to both sides have increased in recent months, and the fighting in northeastern Iraq demonstrates that neither has backed off from employing them even against Kurdish population centers. In mid-March 1988 Iraq and possibly Iran used lethal agents during counterattacks near Halabjah, with casualty figures among the Kurds caught in the crossfire estimated to be in the hundreds. We do not believe the prospect of further civilian casualties would dissuade either side from using chemical weapons.

8. Until 1986, release authority for chemical weapons in Iraq was held at the highest levels of decisionmaking, perhaps exclusively by President Husayn. This was probably to ensure control of a limited stockpile of chemical munitions and to guarantee that sufficient supplies would be available to counter large Iranian offensives. Baghdad may also have believed that tight control of chemical weapons would make it easier to deny that Iraqi forces had employed CW. In 1986, CW release authority was delegated to corps-level commanders as the result of Iraqi losses during the Al Faw and Mehran campaigns and after the military apparently convinced President Husayn to change release authority for chemical weapons to permit better integration of CW into battle plans. Chemical weapons now appear to be an important adjunct for the achievement of tactical objectives.

9. In our judgment, the Iraqis perceive chemical weapons to be an effective complement to their conventional arsenal. Overall, we believe the frequency of chemical weapons use—probably constrained only by availability—has increased, and the effectiveness of Baghdad's CW employment in major battles is improving.

10. ***Constraints on Iraqi Use.*** By denying its use of CW, Iraq has shown some concern for international consequences. Baghdad's main concern has been that any public outcry would further complicate its efforts to obtain necessary conventional war materiels as well as necessary CW materials. Although limited international reaction has thus far not deterred Iraq's chemical employment, no political or religious constraints seem to bear seriously on Husayn's decision to employ CW. International and regional pressure—United Nations condemnatory resolutions, demarches, and export controls—have been ineffective in stopping the development of the CW program or continued battlefield use.

Iran

11. We believe that, as Iran's chemical weapons stockpile increases and Iraqi chemical attacks continue, Tehran will selectively increase its use of chemicals

Table 2
Selected Chemical Weapon Employments

Date	Area Deployed	Type	Approximate Casualties
Iraqi Use			
July 1982	Mandali and Basrah	CS type	Few
August 1983	Haji Umran and Mt Kordeman	Mustard	Less than 100
October-November 1983	Panjwin	Mustard	3,000
February-March 1984	Majnoon Island	Mustard	2,500
March 1984	Al Basrah	Tabun	50 to 100
March 1985	Hawizah Marsh	Mustard/tabun	3,000
February 1986	Al Faw	Mustard/tabun	8,000 to 10,000
December 1986	Umm ar Rasas	Mustard	Reportedly in the thousands
April 1987	Al Basrah	Mustard/tabun	5,000
October 1987	Sumar/Mehran	Mustard/nerve agent	3,000
March 1988	Halabjah	Mustard/nerve agent	Reportedly in the hundreds
Iranian Use			
April 1987	Al Basrah	Phosgene/CK	50
October 1987	Sumar/Mehran	Mustard (possible)	Reportedly in the hundreds
March 1988	Halabjah	Cyanogen chloride	Reportedly in the hundreds

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in retaliation, and possibly as a preemptive weapon. In April 1987, Iran clearly crossed the chemical barrier, using chemical agents in a militarily significant but limited quantity in the Al Basrah area. Before then, Ayatollah Khomeini apparently had restricted the use of chemical weapons on moral and possibly religious grounds, reportedly approving the retaliatory use of chemicals only in early 1987. This apparent change in policy seems confirmed by a mid-October 1987 Iranian mustard attack in retaliation for an Iraqi chemical attack.

12. ***Constraints on Iranian Use.*** Due to Iraq's much greater chemical capability, we assess that Iran will remain cautious and selective in its use of chemicals. We are confident, however, that the Iranians will continue to use and probably increase their employment of chemical weapons to meet military requirements or to retaliate for Iraqi chemical attacks.

Battlefield Effectiveness of Chemical Weapons

13. Faced with superior numbers of Iranian soldiers in a war of attrition, Iraq elected in 1982 to use the riot control agent CS in conjunction with conventional weapons, hoping to solve its military dilemma. Iraq's early uses of mustard and tabun in 1983 and 1984 were probably militarily ineffective because of poor employment techniques and unsuitable weather conditions. In some cases, Iraqi pilots released chemical munitions from too high altitudes and rarely delivered enough agent at one time to be militarily effective. In other cases, chemical bombs were released too low for their fuzes to function. Iran thus obtained numerous Iraqi chemical weapons intact and scored a major propaganda victory by publicizing this evidence (see figure 2). Also, Iraq used chemical weapons in damp conditions—particularly in the southern border area—when the wind was blowing toward its own troops and in daylight. In 1983, for example, Iraq used fighter-bombers, artillery, and helicopters to deliver mustard in an effort to dislodge Iranian forces around Mount Kordeman in the northern border area. The chemical attacks had little effect on Iranian troops; however, the Iraqi forces were exposed when the wind shifted toward Iraqi lines and the dense vapor flowed downhill—away from the Iranians.

14. The Intelligence Community believes that in some cases during specific battles Iraqi chemical employments have been tactically effective. Whenever the Iraqis used good delivery techniques, weather conditions and terrain were favorable, and the Iranians were not adequately prepared or trained, the use of chemical weapons has been effective. Iraqi mustard

Figure 2. Iranian soldier with mustard sample from Iraqi chemical bomb.

use was a major factor in stopping an Iranian advance at Panjwin in 1983, and in the February 1986 Al Faw campaign about 20 to 30 percent of the Iranian casualties were from CW. In some campaigns, Iraqi CW attacks contributed to stopping the Iranians and disturbing the momentum of an Iranian attack. (See figure 3 for a listing of chemical agents used in the war and their effects.)

Strategic Results

15. As currently employed, chemical weapons will sometimes allow tactical advantage, but are unlikely to affect the war strategically. Baghdad, thus far, has not shown the intention to commit the full CW resources necessary to gain a true strategic advantage. Because Iran does not currently have a significant chemical capability, we anticipate its use of chemicals will continue to increase slowly but will not be decisive. As long as both Iran and Iraq continue to employ chemicals in primarily defensive operations, neither nation will gain a strategic advantage, based purely on the use of chemical weapons. However, a concentrated use of chemicals by either side may create a tactical advantage in a localized situation. We should also expect to observe the introduction of more lethal agents such as VX.

Implications—Domestic and International—of the Chemical War

16. The 1925 Geneva Protocol has not been an effective impediment to the spread and use of such weapons in the region. We believe the perceived successes of such weapons on the Iran-Iraq battlefield, coupled with the lack of meaningful international sanctions or condemnations, may suggest to Third World states that they can acquire a CW capability as a deterrent or a military force multiplier. Proliferation in the Third World has been tied primarily to the availability of technologies—mostly from Western Europe. The high profits from the sale of technology and precursor chemicals, as well as the difficulty of regulating dual-use materiel, have made it impossible to achieve the necessary economic and political steps to stop proliferation and weaponization. The increasing number of nations that possess chemical capabilities suggests that chemical weapons are being integrated into their conventional weapons arsenals. (See figure 4.)

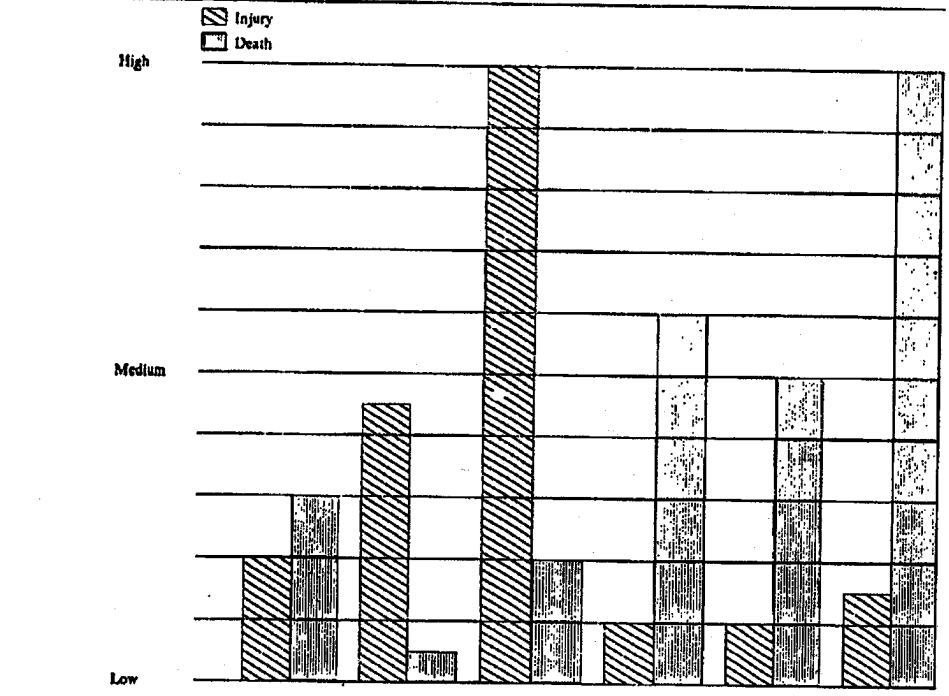
Implications for the United States

17. As more nations acquire a chemical capability, military and peacekeeping forces must expect the threat of either intentional or inadvertent exposure to chemical attack. We do not currently believe that Iran intends to use CW in the Persian Gulf area, but it is likely that in a confrontation chemical weapons could be used. The proliferation of CW programs indicates a widening threat from an increasing number of chemical agents. The United States must expect to face a variety of agents—not only those that are expected to be used on the NATO battlefield, but others such as those used by Iran and Iraq.[4] The use of "standard" CW agents and agents in different forms such as those that have been identified in the Iran-Iraq war has created unexpected vulnerabilities, such as:

— The simultaneous use of several agents during any attack, and resultant problems for detection and casualty treatment. Iraq and, to a lesser extent, Iran have each demonstrated the capability to concurrently employ different agents,

[4] Examples of expected Warsaw Pact agents are GB, GD, HD, VX, and L; examples of Middle East agents are GA, HN, CG, and CK.

Figure 3
Casualty Characteristics of Chemical Warfare Agents



Agent	Cyanogen chloride	Phosgene	Mustard	Tabun	Sarin	VX
Class	Blood	Choking	Blister	Nerve		
Primary routes of exposure	Inhalation	Inhalation	Inhalation Skin Eyes	Inhalation Skin Eyes	Inhalation	Inhalation Skin Eyes
Physiological effects	Oxygen deficiency	Lung damage	Skin/respiratory tract blisters	Nervous system paralysis		

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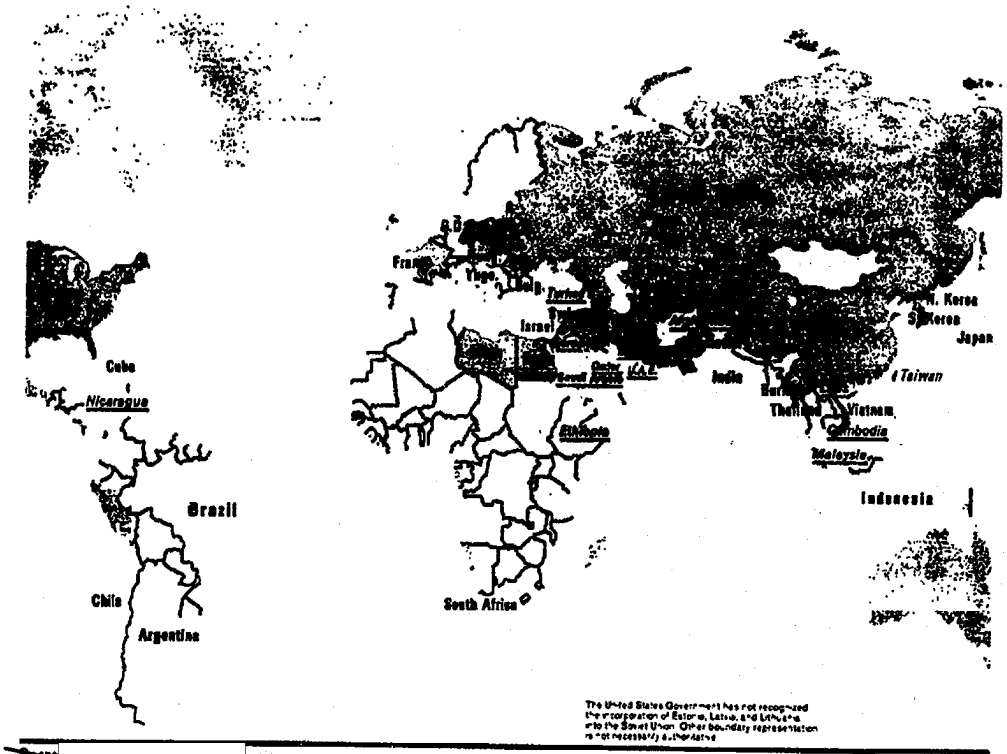
Figure 4
Worldwide Chemical Warfare Capabilities

Confirmed | Initial stage | Latent
Suspected | Seeking stage | Laos Country under watch



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sometimes in the same munition, in an integrated fire plan.

- Decontamination of tabun can lead to liberation of dangerous cyanide compounds.
- The currently fielded US-NATO atropine-oxime treatment regime may not be as effective against tabun as it is against sarin and VX, because of the oxime used.
- Nitrogen mustard that may be in the inventories of both Iran and Iraq is not detectable with current chemical alarms or detector papers.
- Sulfur mustard (in a dusty form) may not be detected by the current chemical alarms.
- Mustard employed as a powder or dust (particles less than 5 microns in size) can penetrate current NATO air-permeable protective clothing. In addition, the dust form of CW agents may cause problems for detectors that use a filter and rely on agent vapors for detection. (See CIA/DI SW 86-10038X [Secret] August 1986, *Dusty Mustard: Iraq's Use of an Old Chemical Warfare Agent*, for a more complete discussion of the dusty form of mustard.)

Observations From the Chemical War

- CW in various agent forms have penetrated protective clothing.
- CW tactical delivery methods have improved with experience.
- CW has been locally effective in some instances. Its effect has been maximized when surprise has been achieved against unprepared troops.
- CW can contribute to tactical successes as one component of an integrated fireplan.
- CW has been used largely in the defense role.
- CW agent has been used as an area denial weapon.
- CW, ineptly employed, has not proved to be a panacea to make up for other weaknesses. Nonchemical tactical weaknesses such as failure to maximize advantages and ineffective employment of tactical airpower carry over into employment of CW.
- CW employment shortcomings have included use of inadequate concentrations in relation to required area coverage, enemy troop numbers, weather and terrain, ineffective delivery, and failure to integrate CW properly with the scheme of maneuver.

Implications for Chemical Warfare Treaty Negotiations

18. The continuing proliferation of chemical weapons—which has been spurred by CW in the Gulf war—greatly complicates attempts to conclude a treaty banning chemical weapons. Several CW-capable states have made disproportionately large investments in these weapons and may be unwilling to relinquish these weapons under a treaty. Most proliferant states are seeking a CW capability because of a perceived threat from neighbors and probably would not entirely dispose of their capabilities if they felt their enemies might cheat on a treaty. Finally, many of these states may decide to maintain their CW programs even after signing a treaty in light of the limited international response to Iran's and Iraq's use of chemical weapons.

ANNEX A

IRAN'S CHEMICAL WARFARE CAPABILITY

The mass casualties resulting from Iraq's chemical attacks, Tehran's apparent belief that Iraq's chemical campaign has affected the outcome of several offensives, and the apparent lack of international condemnation of Iraq have led Iran to develop a chemical weapons capability. The chemical program, begun in 1983, is believed to be primarily under the auspices of the Iranian Revolutionary Guard Corps with some involvement by the Ministry of Defense. (See figure 5 for the organization of Iran's CW program.) The goals of the program appear to:

- Develop a chemical warfare (CW) program in an effort to deter Iraqi chemical weapons use.
- Inflict CW casualties on Iraqi troops.
- Employ chemical weapons as a force multiplier.
- If necessary, offer chemical weapons or technology to other countries, in trade for other arms critical to Iran's war effort.

Production

We believe that Iran has been producing small quantities of CW agents since at least 1984. Iran's indigenous chemical industry may have permitted it to make progress in developing a production capability for some CW agents, although the quality and quantity of the agents remain unclear.

we assess that the principal agent being produced is sulfur mustard, with lesser quantities of other agents—possibly cyanogen chloride and nitrogen mustard—being produced. Tehran has weaponized toxic industrial chemicals such as phosgene. In addition, Iran has shown interest in making nerve agents, although sizable production apparently has not yet occurred. No specific full-scale production site has been identified. Iran may also have recovered chemical munitions and recycled chemical agents from Iraqi battlefield duds into its own delivery systems.

Iran has developed a number of deliverable chemical munitions since 1984. In early 1986 it attempted to purchase conventional spray systems for light aircraft as agent disseminators. Reports in early 1987 indicated Iran possessed 500 agent-filled 250-kg bombs, which equates to over 40 tons of agent fill. We believe that Tehran has a small arsenal of chemical artillery and mortar shells, and about 200 tons of stockpiled agent. The size of its production capability and stockpile were sufficient to permit the shipment of chemical weapons to Libya in September 1987. Despite its range of weapons and the amount of agent, we believe that Tehran's military options are limited by insufficient quantities of weaponized chemicals to affect a major battle, uncertainty of its weapons, and a limited logistic capability to support the movement of chemical weapons to the battlefront. As an example, while the Iraqi Air Force was able to fly approximately 125 chemical sorties on four days in March 1987, a similar level of use would exhaust the entire estimated stockpile of Iranian bombs.

we estimate that Iran produced about 100 tons of CW agent (mostly mustard) in 1987 and may produce twice that in 1988. Production could increase tenfold or more in the next several years if Tehran continues to stress quantity over quality and if a decision is made to meet military requirements for chemical weapons to support the war with Iraq.

We believe that Tehran has developed its CW agent production capability with foreign assistance.

Firms in India and Singapore have been employed to disguise the end user and circumvent export controls. Tehran may likewise have obtained the necessary chemical processing equipment from foreign suppliers, mostly in Western Europe. Much of the technical expertise has been obtained from Iran's own scientists and engineers; however, since they have mostly petrochemical experience, many problems have been encountered and agent quality may have suffered. To

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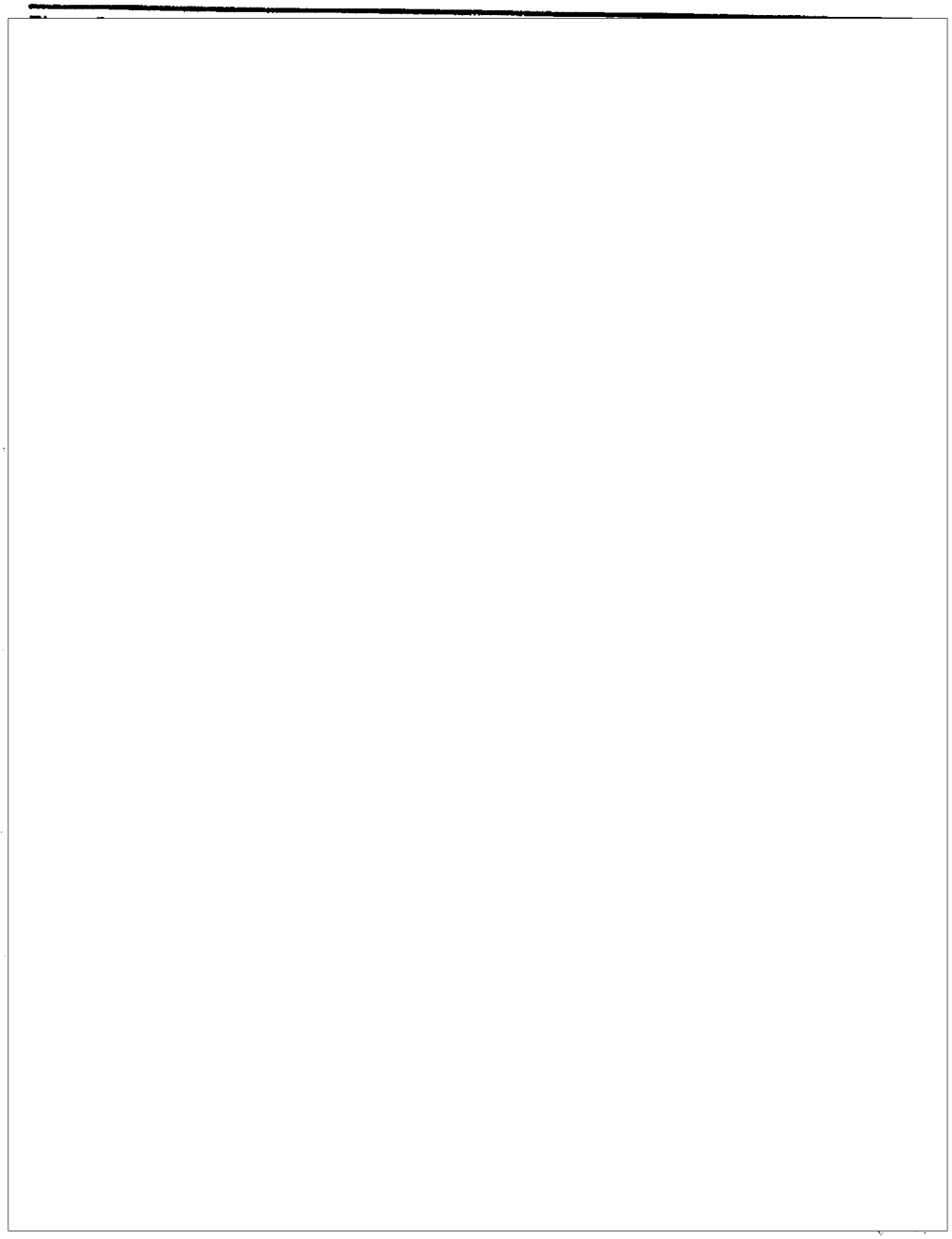


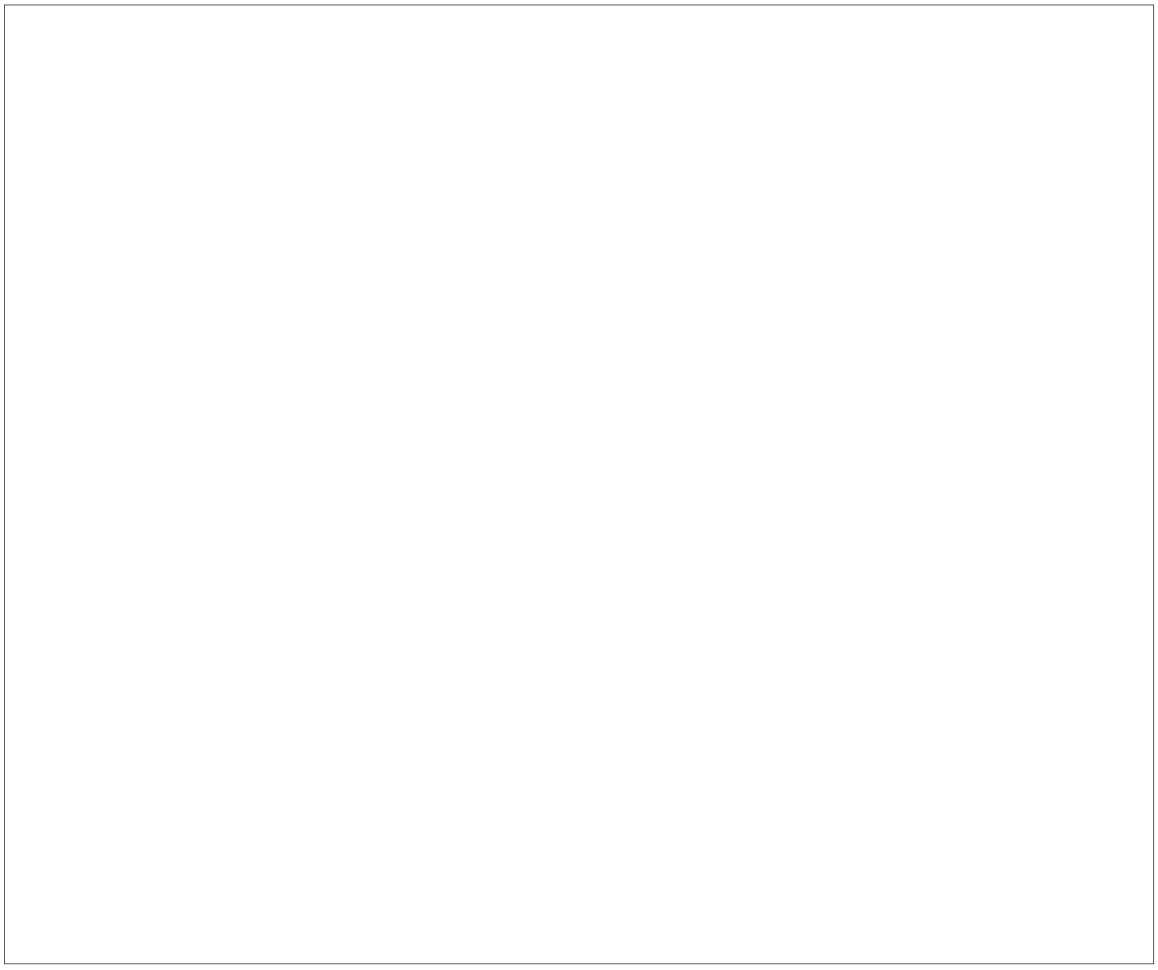
alleviate some of these problems, Iran reportedly is receiving technical assistance from West European firms and from North Korea.

Expected Trends

Because Iraq has not been deterred by international pressures, it appears that Iran sees little choice but to expand its chemical weapons capability. Embargoes and export controls have merely slowed down Tehran's acquisition of precursors, raised costs, and motivated Iran to develop and expand its indigenous programs to reduce its dependence on external support.

We do not believe that Iran currently intends to spread its chemical war into the Gulf region. None of the Gulf states is known to have an offensive CW capability and there is no formal war with the other Gulf states. Iran has taken steps, however, to warn its naval elements to be prepared to use CW weapons offensively.

Although Iranian-produced chemical weapons have been transferred to Libya, we do not know if Tehran would supply other nations or organizations. We judge that the transfer of chemical weapons to terrorists is unlikely under current circumstances.



ANNEX B

IRAQ'S CHEMICAL WARFARE CAPABILITY

Iraq initially sought to acquire a CW capability to counter a perceived Israeli CW threat. The development of its chemical weapons capability began in the early to mid-1970s, well before its war with Iran. In the early to mid-1970s riot control agents were employed to subdue dissident Kurdish activity in northern Iraq. The hostilities with Iran in the early 1980s gave additional impetus to the chemical program. The initial political and military decision to employ chemical weapons against Iran seems to have been made in an effort to minimize personnel (Baghdad's critical resource) and material losses. Baghdad apparently believed that chemical weapons, in combination with conventional weapons, would be useful in defeating or stalling Iranian attacks.

Production

Iraq now possesses the largest chemical weapons production capability in the Middle East and has the capacity to increase its stockpile significantly over the next few years. The principal agents being produced at Iraq's CW production facility near Samarra' are the blister agent mustard and the nerve agents tabun and sarin. The riot control agent CS is also produced there. In addition, Iraq appears to be producing at least small quantities of the nerve agent VX and researching the production of the psychochemical BZ.

current Iraqi production rates to be about 165 metric tons (mt)/month of sulfur mustard, 4 mt/month of tabun, 20 mt/month of sarin, and 5 to 10 mt/month of CS. (See figure 6.) Based on these figures, the Iraqis could, in one month, produce enough agent to fill 2,000 250-kg bombs with mustard, about 50 250-kg bombs with tabun, around 250 250-kg bombs with sarin, and 6,500 mortar rounds with CS, or any combinations of the above.

Besides its primary CW production facilities near Samarra' and research and development facility at Salman Pak, three probable new CW production facilities have been identified in the Al Habbaniyah area of Iraq. Baghdad may be trying to establish redundancy in its system, making it less susceptible to preemptive strikes against its chemical infrastructure, while at the same time increasing the amount of agent available for use in the war.

Before the onset of hostilities with Iran, the lack of urgency for the development of a chemical weapons program allowed Iraq time to place students in selected schools abroad, with the goal of developing a pool of technically competent scientists. In 1979, however, Iraq still lacked indigenous technical expertise for the production of lethal chemical agents. This necessitated Baghdad's relying heavily on foreign countries for technical assistance, as well as for materials. As of late 1987, Iraq was still relying on foreign assistance to build, maintain, and supply materials for its future and existing chemical production facilities. We estimate that its technical manpower and engineering shortfalls will be overcome within the next four to six years.

Embargoes on precursor chemicals have not stopped Iraq's program—only slowed the pace of the chemical weapons program. They have increased the cost of the program and intensified Baghdad's search for additional precursor sources, equipment, and technology, as well as stimulating Iraq's efforts to internally produce precursor chemicals. Despite numerous Western export controls, acceleration of the Iraqi program has been made possible by aid from a number of West German firms

We believe that, with the help of these firms and others such as

the Iraqi program will be self-supporting and virtually independent of foreign embargoes and outside intervention within the next few years.

Weapons Delivery

Iraq has delivered its chemical agents in 250- and 500-kg bombs, aerial spray apparatus, and, to a lesser degree, in 90-millimeter air-to-ground rockets. Soviet-built SU-22 and MIG-23 aircraft, as well as MI-8 and French-built Gazelle helicopters and Mirage aircraft, have been the air force delivery platforms for chemicals. (See figure 7.) Early employment problems seem to have been solved by pilots using improved delivery parameters coupled with proper fuzing.

Figure 7. Air delivery platform.

Baghdad has chemical artillery shells for its 82-mm and 120-mm mortars and its 130-mm, 152-mm, and 155-mm guns. (See figure 8.) More recently, Iraq has used 122-mm ground-to-ground rockets loaded with plastic canisters filled with multiple types of chemical agents. A 40-tube launcher is capable of delivering 120 to 240 kg of agent per salvo. (See figure 9.) Reportedly, Iraq plans to produce a chemical warhead for a longer range missile.

In our judgment, Iraq continues to acquire casings for the delivery of both chemical artillery and aerial bombs, and is now purchasing equipment for the manufacture of these munitions. Baghdad's al-Muthanna Enterprises, which is in some way related to the State Organization for Chemical Industries (SOCI), and al-Qaqaa State Establishment are involved in CW agent and CW munitions production. Both are subordinate to the State Organization for Technical Industries (SOTI), which reportedly was renamed the State Organization for War Production (SOWP) in mid-1987. (See figure 10 for the organization of the Iraqi CW program.)

Figure 9. Chemical-capable multiple rocket launcher

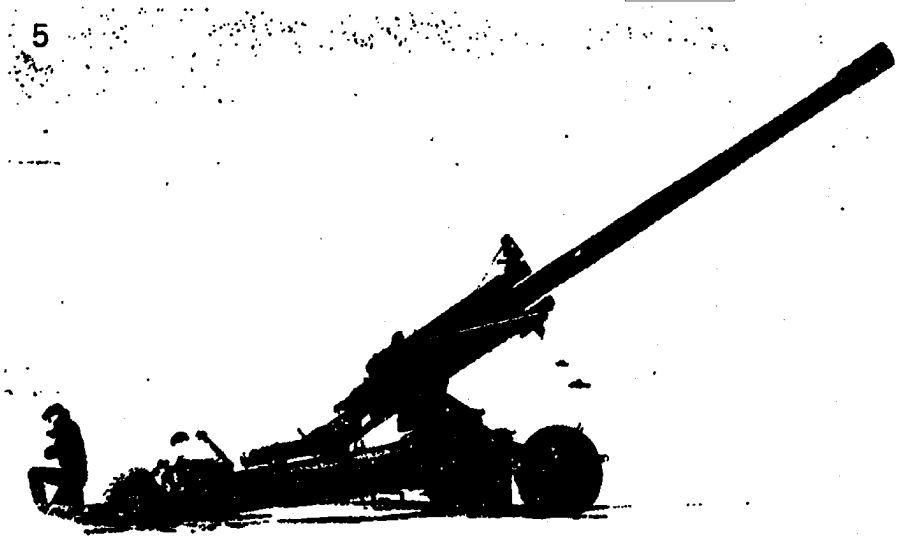
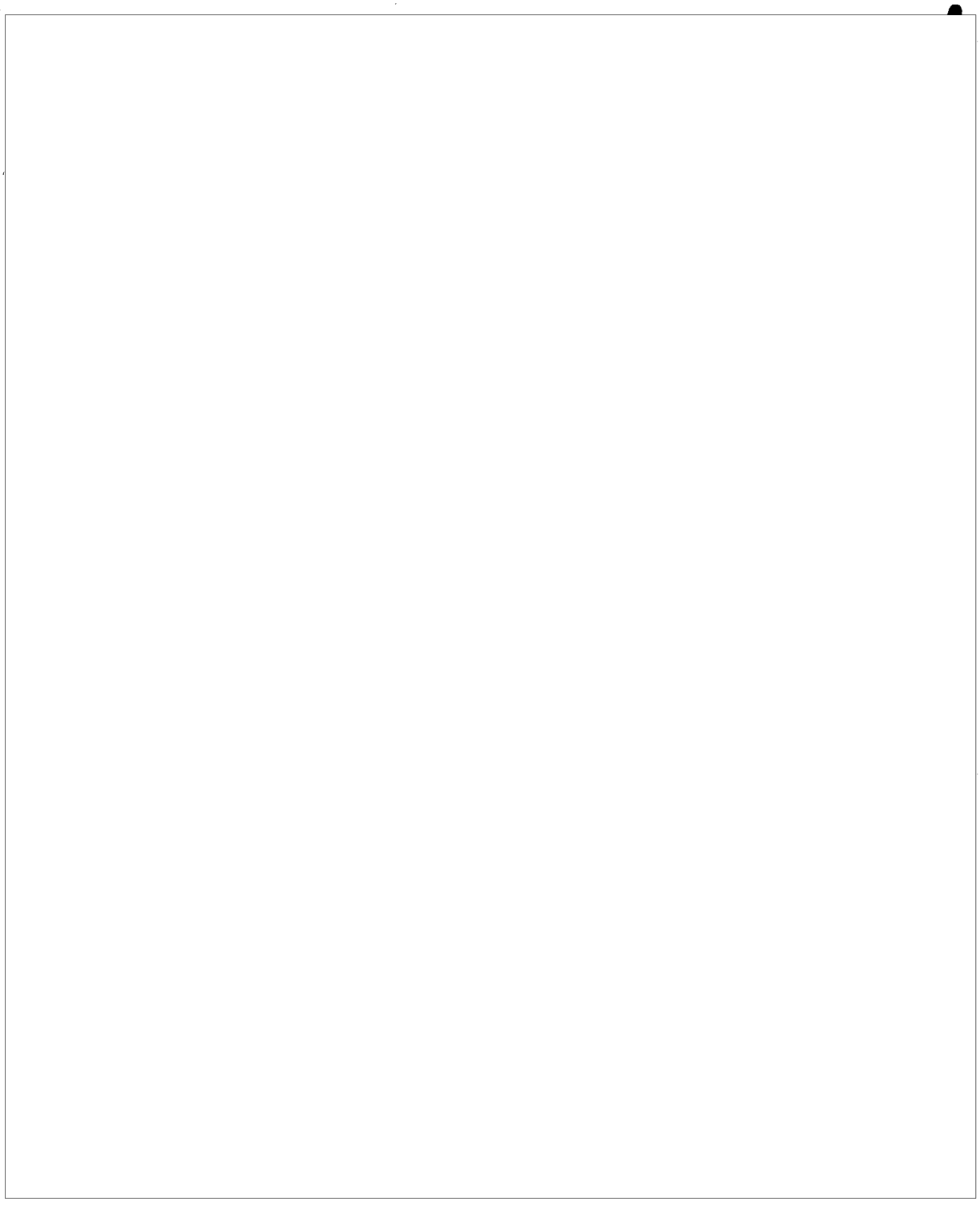


Figure 8. Chemical-capable artillery.



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ANNEX C

MEDICAL HANDLING OF CHEMICAL CASUALTIES

Chemical casualties require not only transportation but, in some cases, labor-intensive hospital care. Iran has apparently tried to care for its chemically wounded, but with only limited success. In some battles the chemical casualties have been in the thousands, which has overwhelmed the medical transportation system and caused secondary contamination casualties among the transportation and medical staffs. Iraq's medical support system has not been significantly tested. If Iran were to increase its use of chemicals, it would probably also overwhelm Iraq's medical systems. We believe that neither country's medical logistic capability could manage a large number of chemical casualties over a sustained period.

The majority of the Iranian casualties have been mainly from mustard agents in both liquid and dusty forms. The latter type is finely ground (0.1 to 10.0 microns) silica impregnated with mustard agent. The two forms differ with respect to the nature of skin injury, the intensity of lung injuries, and the latent period with the dusty form being more effective. The latent period can be militarily significant because it affects the time a soldier can continue to fight before the effect of the agent becomes debilitating. Dusty mustard can affect soldiers within as few as 15 minutes, while the liquid or vapor mustard may not have an effect for four to six hours.

Casualty Handling

Iran's combat casualty handling system is not sufficient to cope with the tens of thousands of non-CW war casualties. The influx of chemical casualties and the special handling associated with decontamination and treatment have exacerbated the situation. The government is unwilling or unable to take the necessary steps to improve significantly the situation. Even though Tehran's capabilities to treat chemical warfare victims have improved since the early 1980s because of measures initiated in the wake of repeated chemical attacks, they still cannot handle large numbers of chemical casualties over a sustained period.

Several factors have contributed to large numbers of Iranian chemical casualties: soldiers are unable to don protective clothing quickly when attacks occur (perhaps attributable to a lack of training and field conditions that are too hot for protective clothing to be worn at all times); a great many of the Iranian soldiers are bearded, causing poor mask fit (see figure 11); soldiers are unable to quickly ascertain that they are involved in a chemical attack or identify the agents early in an attack; soldiers receive ineffective decontamination and treatment at aid stations; and antidotes are often used incorrectly. Another cause of increased casualties is that Iranian soldiers received little or no chemical training prior to 1982. the Revolutionary Guards receive more protective clothing and masks than the regular army, although the regular army seems to be conducting

Figure 11. Iranian protective ensemble.

better defensive chemical training.

Because there is no antidote for mustard, immediate decontamination is essential. In many Iranian cases, decontamination has been delayed for one to 24 hours following exposure. In general, Iranian decontamination has been poorly accomplished—by showering or by the use of bleach solutions—or it is simply not done. The inadequacy of the decontamination system is best demonstrated by the fact that a number of victims have arrived at the larger Iranian and European hospitals still contaminated with mustard agent. This is not only an indication of a lack of chemical awareness, but perhaps more significantly, it is a serious source of secondary contamination that increases the number of casualties. There are reports that pilots transporting chemically wounded troops, and physicians treating casualties in rear area hospitals frequently become contaminated by residual agent. Iranian physicans have reported that sodium thiosulfate administered intravenously followed by topical application of sodium thiosulfate is effective if initiated within three hours of exposure to mustard. Reportedly, Iran has used atropine in the treatment of mustard casualties. Atropine is normally used only for nerve agent victims.

The Iranian troops have been provided both atropine autoinjectors and amyl nitrite capsules, antidotes for nerve agent and cyanide intoxication, respectively. Although inappropriate and another indication of poor training, these antidotes have been self-administered following exposure to mustard gas. Most of the Iraqi protective equipment has been received from the Soviets through military aid agreements or produced indigenously. It is similar to standard field issue for Soviet troops. Protective equipment for Iranian forces has been obtained from a wide variety of Western sources as well as from indigenous production, but quantities are insufficient to outfit the entire army.

The treatment of casualties at the battlefront and evacuation are apparently inadequate. This results in a reported high mortality rate at the front for both the chemical and conventional casualties. Field stations are not equipped to handle chemical casualties. The chemical casualties that survive are transported rearwards to medical dispensaries or to large cities such as Tehran. (See figure 12.) Evacuation is accomplished by

Figure 12. Val-Fajr chemical casualty infirmary at Azadi Stadium, Tehran

trucks or in some cases by planes, which reportedly have no special arrangements for transporting the wounded. Poor frontline medical treatment and an inadequate transportation system have caused chemical casualties with reported mortality rates as high as 60 to 80 percent during transportation from the battlefield to the larger city hospitals.

Another reported complication in the evacuation process is that the chemically wounded are not separated from the patients with conventional wounds. Due to the lack of effective decontamination, the nonchemical casualties have at times become contaminated with chemical agent. One medical facility, the Shahriar Hospital in Tehran, will not treat CW victims as several physicians and nurses have been contaminated while administering treatment. Casualties remain at this facility only until arrangements can be made to ship them to other hospitals or foreign countries for treatment.

Early in the chemical war, hospitals in the larger cities seemed to have been overwhelmed by the number of chemical casualties. In an attempt to solve the problem, Tehran has apparently established a number of medical facilities that are dedicated to CW casualties, an example being the Val-Fajr infirmary in Tehran, a large sports arena that was converted to administer care to minor chemical victims. Since 1984, the ability to cope has improved somewhat and a higher quality of care for the chemically wounded seems to be available. United Nations reporting has established that the level of care at these facilities, although improving, is still below Western standards.

information on the length of hospitalization for chemical casualties. For one group of 176 victims injured in February-March 1986, the length of hospitalization ranged from three days to about two months. No further breakdown was provided. In the case of the Val-Fajr infirmary in Tehran, the average stay was reportedly four days for skin injuries and seven days for eye lesions. (See figure 13.) This may not indicate quick cure or recovery, but the fact that the infirmary is a minor care facility.

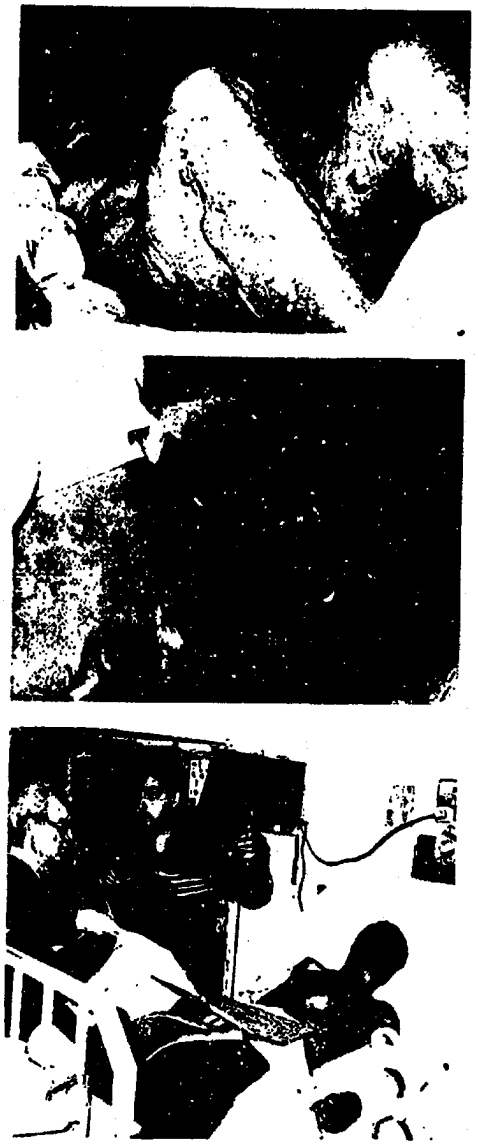

Figure 13. Iranian chemical casualties. Injuries include skin lesions and blisters indicative of mustard agent.

The total number of chemical casualties from chemical use is difficult to estimate. The further breakdown into mortality is equally difficult. A breakdown does exist, however, for the February-March 1986 offensive. Iranian sources report that in this campaign chemical casualties could have ranged from 8,000 to

10,000 of the 30,000 to 50,000 battlefield casualties.[3] This compares with a 25-percent estimate for the Operation Kheibar offensive in 1984. A very broad generalization can be made from a survey of the data base on the chemical war concerning mortality. Of the chemical casualties, the death rate appears to be between 3 and 4 percent. We believe that the prospects for improvement of the Iranian medical reaction to chemical attacks remain bleak primarily because of the lack of effective military discipline. Failure to enforce the proper issue and wearing of protective clothing and masks will continue to result in high chemical casualty rates, especially among the Pasdaran and Basiji.

[3] Estimates of casualties in the Iran-Iraq war are difficult to confirm.

Because of the low-level CW use by Iran, information on Iraq's chemical preparedness and chemical casualty management is limited. The concept of medical care seems to consist of retrieving the casualties, and sorting, treating, and evacuating the wounded to the nearest hospital. Evacuation has been a problem as the Iraqis have a limited capability, and we are convinced a large number of chemical casualties over an extended period would severely tax an already marginal system.

There is no information available on the evacuation and treatment of recent Iraqi chemical casualties, but it is assumed that Iraq's procedure probably would be based on Soviet casualty procedures. Although Iraqi mustard victims have been treated at Rashid Military Hospital in Baghdad, the nature of the treatment rendered is not known.