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Chemical Weapons in the Middle East

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The spread of chemical and biological weapons in the Middle East has ominous implications for the United States and its allies. Six countries in the Middle East have the ability to wage chemical warfare: Egypt, Iran, Iraq, Israel, Libya, and Syria. In contrast, only two countries had more than limited capabilities a decade ago. Today, Iraq and Syria have extensive programs, Egypt and Israel appear to have revived largely dormant programs dating to the 1960s, and Iran and Libya have undertaken major initiatives that will give them extensive capabilities within a few years.

This dangerous proliferation was unleashed by Iraq's extensive employment of poison gas during the eight year Gulf War: the Iraqis demonstrated that chemical weapons can be of some military importance, that the benefits of using such weapons outweigh the costs, and that the world

EXECUTIVE SUMMARY

The proliferation of chemical and biological weapons in the Middle East is an accomplished fact. It is too late to prevent the spread of either type of weapon. This poses a potential threat to the United States and to its allies in the region. Fortunately, there are operational constraints that reduce the dangers posed by these weapons and retaliatory policies can reduce the incentive to use them. More specifically:

- *At least six Middle East countries manufacture chemical weapons — Syria, Israel, Egypt, Iran, Iraq, and Libya — and the latter four have probably used them. In addition Iran, Syria, and Iraq are reportedly working on chemical warheads for ballistic missiles.*
- *At least five countries in the region have, or are working to acquire, a biological warfare capability: Egypt, Iran, Iraq, Israel, and Syria. Iraq and Syria appear to have the most advanced programs.*
- *West European and Japanese companies and individuals have played a key role in the construction of facilities to manufacture chemical agents, throughout the Middle East.*

Efforts to slow the proliferation of chemical and biological weapons must become a high priority of the United States. Among its options are to continue hindering the transfer of production technology, promoting international agreements to strengthen the 1925 Geneva Protocol as well as sanctions against its violators, assisting U.S. allies to acquire defensive gear, and assuring them that the United States will actively support any ally under chemical or biological attack.

community is unwilling to punish widespread violations of international agreements that forbid the use of chemical weapons.

The growing availability of chemical weapons in the Middle East, and the demonstrated willingness of countries in the region to employ poison gas, justifiably concerns the United States and its allies. U.S. military forces stationed in the area are obviously endangered by chemical agents. If our forces have to conduct military operations in the Middle East, it is increasingly likely that they would be fighting an enemy armed with chemical and biological weapons.* Countries friendly to the United States, including Egypt, Israel, Jordan, and Saudi Arabia, are potential targets of chemical weapons, a fact that also should worry policy-makers in Washington.

The United States has attempted to deal with these problems but its policies have been fraught with contradictions. Positive steps have included efforts, under the auspices of the "Australian group" – an informal association of Western countries – to contain the proliferation of chemical warfare capabilities.

In addition, the United States has supported international efforts to strengthen the Geneva Protocol of 1925 that prohibits the use of lethal chemical agents. The existing agreement does not include sanctions against countries that employ chemical agents. In January 1989, an international conference will be held in Paris to explore means of strengthening this agreement.

Unfortunately, the beneficial effects of these initiatives were more than offset by the failure of the United States, the Soviet Union, and other countries to respond effectively to Iraq's extensive use of chemical weapons against the Iranians and the Kurds. This inaction resulted from

* See the glossary on page 14 for explanations of the terms.

a concern that Iraq might lose its war with Iran. The United States deplored Iraq's conduct but nevertheless continued to provide tacit and some overt assistance to the Iraqis. Similarly, efforts by the Congress to impose sanctions on Iraq for its use of chemical weapons were opposed by the administration.

THE PROLIFERATION OF CHEMICAL WEAPONS

The use of chemical weapons was prohibited by the Geneva Protocol of 1925. It did not ban the production or possession of chemical agents. Most countries in the Middle East are signatories to the agreement, including Egypt, Iran, Iraq, Israel, Jordan, Kuwait, Libya, Saudi Arabia, and Syria. Kuwait, Libya, and Syria attached reservations to their ratification indicating that this "does not constitute recognition of or involve treaty relations with Israel."

Six countries in the Middle East are actively seeking to enhance their chemical warfare capabilities. Although the following accounts are believed to be accurate, it is difficult to obtain reliable information on chemical warfare programs.¹

Egypt: The Egyptians first acquired chemical weapons in the early 1960s, and used them during their intervention in North Yemen. According to some U.S. estimates, they are believed to have mounted 32 attacks involving the use of poison gas, possibly including the use of nerve agents, between 1963 and 1967. It appears that these munitions were provided to the Egyptians by the Soviet Union but some of them could have come from British stocks of mustard gas abandoned in Egypt after the Second World War.

The Egyptians were never condemned for their use of chemical weapons in Yemen. Most countries tolerated the Egyptian actions because they were unwilling to jeopardize their relations

with Egypt. The United Nations refused to get involved, despite complaints by Saudi Arabia to the Secretary-General. Indeed, many experts refused to accept reports that Egypt had used chemical weapons. This failure to act by the international community set an unfortunate precedent that presaged the lack of response to Iraq's use of chemical weapons in the 1980s.

During the 1967 Arab-Israeli War, Egyptian forces deployed in the Sinai were well-provided with personal protection gear and decontamination equipment. A facility for filling aircraft bombs with chemical agents may have been captured by Israel at the forward Egyptian air base at El Arish. Reports that chemical agents also were found there have never been confirmed.

By the time of the 1973 Arab-Israeli War, Egyptian chemical warfare capabilities had grown considerably. The entire Egyptian army was equipped with protective gear, much of it of considerable sophistication. In addition, the Egyptian army had aircraft bombs and probably artillery ammunition, including short-range rockets, for the delivery of chemicals.

Analysts in the United States believe that the Egyptian chemical program was not intended for offensive purposes. One school of thought has argued that Egypt acquired the chemicals to protect against a decisive defeat like that suffered in 1967. Egyptian chemical capabilities limited the kinds of military operations that Israel could conduct. In addition, possession of chemical weapons reduced Israel's ability to mount retaliatory strikes in the event Egypt did well on the battlefield.

Whatever the rationale for the program, Egypt has not used chemical weapons since 1967. Significantly, it has never used them against Israel despite suffering military defeats in 1967, 1970, and 1973 at the hands of the Israeli military. This strongly suggests that the potential benefits of employing chemicals did

not match the probable costs of Israeli retaliation.

Egypt continues work on its chemical program. Currently, it is manufacturing chemical agents, probably including nerve gas and mustard gas. Egypt may be producing precursor chemicals needed to make poison gases. It is also able to make the munitions needed to deliver chemical agents, including aircraft bombs, short-range artillery rockets, and artillery shells. The Egyptian army continues to stage chemical exercises on a regular basis.

It is possible that the Badr 2000 (also known as the Condor-2) surface-to-surface missile being developed by Egypt and Argentina may be intended to carry chemical munitions. This suggests that the Egyptians may want to keep open the option of acquiring a strategic chemical warfare capability.

Israel: The development of a chemical warfare capability in Israel was a response to the Egyptian program in the 1960s. According to U.S. officials, by 1973 the Israeli military had an offensive chemical warfare capability. There is some evidence that during the past few years the Israeli military has upgraded its offensive chemical warfare capabilities. It is believed that the Israelis have stocks of mustard gas and that they probably make nerve gases of the V-agent family. The Israelis are reported to have manufacturing capabilities for chemical agents in the Negev.

The Israeli military appears to consider offensive chemical capabilities to be an essential deterrent. Israel is the only country in the region to have a comprehensive program to protect their civilian population from gas attacks.

Iraq: The Iraqis are believed to have at least five chemical warfare facilities. The best known is the extensive complex at Samarra, which has storage bunkers and production plants designed to make two nerve agents (Tabun and Sarin at

the rate of 50 tons per year for each) and mustard gas (720 tons per year). In addition, the Iraqis have a research and development facility at Salman Pak which may be working on development of more lethal nerve agents like VX. A plant at Falluja is believed to make precursors necessary for the production of chemical agents. There may be additional facilities in the eastern deserts of Iraq. The Iraqis also may be working on a chemical warhead for their existing surface-to-surface missiles, or for the Badr 2000 missile being developed by Egypt and Argentina with Iraqi funding.

The first confirmed use of chemicals by the Iraqis against the Iranians took place in March 1983. Since then, about 45,000 Iranians and Kurds have been killed or wounded by Iraqi chemicals, according to Iranian estimates. Both civilians and soldiers were targets of the chemical attacks. Iraq's use of chemical agents has been amply confirmed by several U.N. investigations carried out since 1984.

Taha Yasin Ramadan, a member of Iraq's Revolutionary Command Council and its First Deputy Prime Minister, when asked to react to international condemnation of Iraq's use of chemical weapons, expressed the following opinions to an Egyptian newspaper in May 1988:

We cannot rely on the idea that the international community will end the war, and we also reject any move by the international community to ask us not to use certain weapons. I agree that the international community is weak.²

The Iraqi attitude toward chemical weapons was reflected in a statement made by a senior Iraqi military official, Maj. Gen. Maher Abdul Rashid, to the Western press in 1984: "If you gave me a pesticide to throw at these swarms of insects to make them breathe and become exterminated, I'd use it."³

Iran: The current policy of the Iranian government concerning chemical and biological weapons was articulated by Hojjat ol-Eslam Akbar

Hashemi-Rafsanjani, speaker of the Iranian parliament and acting commander-in-chief of its military forces, in the fall of 1988:

Chemical and biological weapons are poor man's atomic bombs and can easily be produced. We should at least consider them for our defense. Although the use of such weapons is inhuman, the war taught us that international laws are only drops of ink on paper.⁴

The first documented use of chemical agents by Iran only took place in 1988. According to Iraqi accounts, 110 of their soldiers fell victim to such attacks. It is generally believed that additional small-scale attacks may have taken place previously. Some of Iran's first supplies of chemical agents may have come from unexploded Iraqi ordnance.

The Iranians are currently able to manufacture limited quantities of poison gases, mainly mustard gas but probably also nerve agents. They have embarked on a major effort to significantly upgrade their manufacturing capabilities. According to British reports, in early 1988 a German chemical company agreed to build a large pesticide plant for the Iranians which will probably be used to make nerve agents. There is some evidence that the Iranians are trying to develop chemical warheads for some of their surface-to-surface missiles.

Syria: The first supplies of chemical munitions arrived in Syria in 1972, when Egypt provided artillery ammunition filled with chemical agents. In addition, by the time of the 1973 Arab-Israeli War, the Soviet Union had provided a considerable quantity of chemical defense gear. According to one report, the Syrians acquired additional chemical warfare capabilities from the Soviet Union and Czechoslovakia in the subsequent decade.

During the past five years, the Syrians have considerably expanded their chemical warfare capabilities. The Soviet Union refused to supply production facilities but the Syrians were able to

obtain the necessary technology from companies in Western Europe. At least one West German company supplied some of the equipment needed to set up a chemical weapons laboratory in the early 1980s. By 1986, the Syrians were able to manufacture chemical agents, reportedly concentrating on the nerve agent Sarin.

The Syrian chemical warfare program operates under the auspices of CERS, a research organization located near Damascus. Additional facilities of an unknown type may be located in Homs, a city north of Damascus.

Although the Soviet Union is not known to have been involved in Syria's efforts to manufacture chemical agents, it has maintained a close watch over the Syrian chemical warfare program. Col. Gen. Vladimir Pikalov, commander of Soviet chemical warfare forces, visited Syria in March, 1988. At the time, the Syrians claimed that he was "boosting the Syrian Armed Forces' combat ability to confront the imperialist-Zionist aggression against the Arab nation."⁵ In September, after such reports were mentioned in the Western press, the Soviets stated that "these assertions are not in accordance with reality ... The U.S.S.R. does not transfer chemical weapons to other countries and does not teach them how to produce such weapons."⁶

Libya: In mid-1987, Libyan aircraft attempted to attack Chadian soldiers with chemical agents. The planes missed the intended targets and no casualties resulted. It appears that this capability may have been provided by Iran. Reportedly, the Iranians supplied the Libyans with nerve agents in 1987 in return for naval mines and SCUD B surface-to-surface missiles.

The first indications that Libya intended to build chemical warfare plants surfaced in 1986. By late 1988, it was believed that the Libyans were ready to start production. According to William Webster, Director of the Central Intelligence Agency, the Libyans have built one of the

largest chemical weapons complexes in the world. Reportedly, it is located approximately 80 kilometers south of Tripoli.

Construction of the chemical weapons complex is believed to have been the work of Japanese and West European companies. Japan Steel Works reportedly built a factory to manufacture aircraft bombs capable of being filled with chemical agents. European companies were apparently responsible for the construction of the plant making the chemical agents. Significantly, even though the Soviet Union provided Libya with defensive equipment, it refused to provide agents in the quantities needed for operational use or to assist Libya in the production of chemical weapons.

THE PROLIFERATION OF BIOLOGICAL WEAPONS AND TOXINS

The spread of biological weapons and toxins is a growing concern for the United States. According to CIA Director Webster, "The moral barrier to biological warfare has been breached. At least 10 countries are working to produce biological weapons."⁷ Some of these nations are located in the Middle East.

Biological agents and toxins are substantially different from chemical weapons. Biological weapons are living organisms that cause disease, killing or incapacitating the victims. Among the organisms known to be used for biological warfare are bacteria like plague, anthrax, and cholera. All are highly lethal. Production of such agents is relatively simple, although extreme precautions need to be taken against infection.

Large quantities of bacteria can be grown in relatively short periods of time so that it is not necessary to maintain large stocks of infectious material in order to maintain a biological warfare capability. The U.S. government estimates that only 96 hours are required for the entire process involved in the production of anthrax.

Toxins are poisons. They are not biological agents, although in many cases they can be produced easily using biological means, typically using bacteria cultures. Unlike biological weapons they are not self-reproducing. Thus, there is less risk of unintended consequences with toxins than with biological agents. They are used like chemical weapons. Relatively little is known about the military use of toxins but it is commonly believed that they are potentially more dangerous than chemical agents.

Fifteen years ago, officials in the United States were convinced that biological weapons were too dangerous to be used. Excessively virulent agents could be as much a threat to friendly forces as to the foe. This explains the willingness of the United States to accept the 1972 treaty banning the use and possession of biological agents and toxins.

Advances in biology, however, are leading many experts in the U.S. government to reassess this comfortable conclusion. It may now be possible to modify existing organisms or to create new ones that might be militarily useful. A number of countries in the Middle East may be capable of conducting such research.

The possession and use of biological agents and toxins was prohibited by the 1972 Biological Weapons Convention. The treaty was signed by several countries in the Middle East including Egypt, Iran, Iraq, Jordan, Kuwait, Libya, Saudi Arabia, and Syria. However, Egypt, Iraq, and Syria have not ratified the agreement, so are not necessarily bound to follow its provisions. These countries are among the states in the region that may have developed a capability to produce biological weapons.

Egypt, Iraq, and Syria are all thought to possess biological agents, and Iran and Israel have the capability to produce them. It is likely that work is being done on toxins in several countries, including Iraq.

Egypt is believed to have worked on acquiring biological weapons during the 1960s. In the early 1970s, Egyptian President Anwar Sadat said that "we have the instruments of biological warfare in the refrigerators." However, he stressed that "we will not use them unless they [the Israelis] begin to use them."⁸ The Egyptians made no use of biological agents during the 1973 war with Israel.

The *Iraqis* are believed to have been working on biological agents for several years and now are believed to have biological weapons in their inventory, possibly including toxins. Reports from Iran that the Iraqis have used biological agents against the Kurds have not been confirmed and should be considered of doubtful accuracy.

Syria is known to have an active biological warfare program. It appears that the Syrians have stocks of biological agents that could be used against an enemy, but it is not known if they have acquired any sophisticated delivery systems. It is possible that Syria has received some assistance from North Korea which has a long-standing biological warfare program.

Two other countries have the ability to produce biological agents, but there is no firm evidence that they have the ability to use them in combat. The *Iranians* have said that they intend to acquire biological weapons but little is known of their capabilities. Knowledgeable observers believe that *Israel* has the ability to produce biological agents, although it may not currently have a biological warfare capability.

OPERATIONAL CONSTRAINTS ON CHEMICAL WEAPONS

Chemical weapons are horrifying and potentially devastating. About a milligram of nerve gas is sufficient to kill a man: this implies that about a kilogram would be enough to kill one million people. For these reasons, efforts have

been made to ban chemical weapons since the beginning of the century.

However, it is important to recognize that the real effectiveness of chemical weapons is likely to be considerably less than their theoretical effectiveness. Less than a teaspoon of mustard gas can kill a man if it is inhaled quickly into the lungs. Nevertheless, during the First World War, more than 60 pounds of mustard gas were used for each man killed or wounded. Moreover, only 2% of the people who were affected by mustard gas died.

There is no reason to believe that the situation is any different today. According to the Iranians, through April 8, 1987, out of a total of 27,571 victims of Iraqi chemical weapons only 262 died. In other words, more than 99% of the victims of poison gas survived. On the other hand, when the Iraqis used substantial quantities of chemicals against the Kurdish town of Halabja, which was unable to defend against Iraqi aircraft dropping chemical bombs and which lacked the most rudimentary chemical defenses, several thousand people died.

The difference between the two experiences comes from several factors. Chemical agents are highly unpredictable. They are very sensitive to weather conditions, including temperature, wind, and atmospheric pressure. Even with high quality weather forecasting it is difficult to ascertain accurately the specific conditions that will exist at a particular place.

Effective chemical attacks require the use of substantial quantities. This is evident in the following estimates, which assume contamination of a one square kilometer area so that 50% of the people present are killed or injured. It assumes people are not wearing chemical defensive gear. If the agent is in the air, 21 tons of phosgene would be needed, 4 tons of mustard gas, 2 tons of Tabun, or 0.5 tons of Sarin. If spread on the ground, 19 tons of mustard gas would be necessary, 14 tons of Tabun, or 2 tons of VX. In com-

parison, total Iraqi production of Tabun and Sarin was only 100 tons per year in 1986.

Use of defensive gear, however, can significantly reduce casualties. According to one estimate made by the Swedish military, a unit wearing gas masks when attacked from the air by Sarin might suffer only 5% light casualties. However, if its countermeasures were ineffective, 80% of the people affected would die or be severely incapacitated and the remaining 20% would become light casualties. Although other countries have developed slightly different estimates, they all demonstrate that casualties are significantly reduced when people are protected by the appropriate defensive gear.

Among the standard defensive systems are gas masks and protective clothing to prevent inhalation of chemicals and to guard against physical contact. Vehicles can be designed to prevent the penetration of gases. Decontamination systems are available to neutralize chemical agents on equipment and on the ground. In addition, the danger from nerve gas can be reduced by ingesting certain medicines prior to exposure. Soldiers can be supplied with antidote substances to be given after exposure to nerve agents that will reduce the lethality of the gas. Devices are also available that can detect the presence of chemical agents, even over long distances. Such equipment can significantly reduce the danger posed by chemical attacks.

These defenses are not perfect, however, and the operational costs of defending against chemical agents can be quite high. Soldiers can spend only limited periods of time in protective suits. This is especially true when temperatures are high, a common condition in the Middle East. For example, the standard Soviet chemical suit, which is made of a rubber compound, can be worn for only 15 to 20 minutes in temperatures of more than 86° F. As a result, it is highly unlikely that sustained, intensive military operations could be conducted if troops were required to wear a full panoply of defensive sys-

tems. An additional problem, also acute in the Middle East, is the requirement for large quantities of water to decontaminate equipment.

For this reason the United States believes that it is necessary to rely on deterrence as well as on defense in the chemical arena. An adversary who knows that his forces will be attacked by chemical agents is unlikely to be the first to initiate the use of chemicals. The impact on operational effectiveness, especially when attempting to conduct offensive operations, is simply too great to be sustained.

Conditions are considerably different for air forces than for ground units. Aircraft are not particularly vulnerable to chemical agents when in the air but can easily be contaminated while on the ground. However, air bases are generally among the best protected installations maintained by most military forces. Air bases are designed to operate even when under enemy air attack.

In the best protected air bases, like those operated by the Israeli Air Force, most critical installations are located underground. Aircraft and personnel have to leave the protection of the hardened facilities only when taking off and landing. By adding appropriate chemical defenses to air bases it is possible to continue operating aircraft even if the airfields are attacked with chemical weapons.

The most serious threat to air bases from chemical attacks may stem from the need to sustain operations over a long period of time. Operating continuously in an enclosed environment is likely to affect performance and to reduce the number of aircraft missions that can be flown.

Several years ago, a U.S. Air Force official estimated that an air base contaminated with persistent chemical munitions would have its ability to generate aircraft missions reduced by half. However, it appears that it is possible to reduce

significantly the impact of chemical attacks through proper training and the use of appropriate defensive equipment.

The greatest impact of chemical munitions is on ground forces forced to wear defensive gear for prolonged periods due to the threat of a chemical attack. This can significantly reduce fighting power and provides a major incentive to use chemical agents. However, the incentive is significantly reduced if the opponent has the ability to retaliate with poison gas.

Ultimately, chemicals are most effective when used against people who have no protective gear and who are unable to retaliate with their own gas weapons. It is civilians who are most vulnerable to chemical weapons.

CHEMICAL WARFARE AND THE ARAB-ISRAEL CONFLICT

Recent initiatives by Syria to strengthen its chemical warfare capabilities, coupled with Iraq's massive use of chemical weapons, have intensified concern that chemical weapons might be used in a future Arab-Israeli war. At present, the main focus is on the possibility that Syria might launch chemical attacks against population centers. In the future, however, the problem is likely to become more acute as Libya and Iraq acquire long range ballistic missiles armed with chemical warheads.

Syria may be tempted to employ chemical weapons against Israel in an effort to overcome the disparity in conventional military power between the two countries. According to a widely espoused point of view, the massive employment of chemical munitions in the opening stages of a war could provide Syria with substantial military benefits.

Chemical strikes against Israeli air bases, equipment storage facilities for reserve formations, and other critical installations, would thor-

oughly disrupt Israeli military activities in the opening stages of a war. Contamination of air bases, according to this argument, would prevent Israeli aircraft from operating during the critical opening hours of the conflict. Attacks on equipment sites would inhibit mobilization of reserve units and keep them from reinforcing forces at the front. According to this school of thought, chemical weapons might thereby provide Syria with the margin needed to achieve a victory.

The Syrians also may believe that they could benefit from employment of chemical weapons in circumstances in which they did not expect to inflict a total defeat on Israel. For example, they could launch an attack to capture the Golan Heights and then use chemical agents to stop an Israeli counterattack. Alternatively, they might choose to use chemical weapons against population centers to spread panic and to undermine the morale of the Israeli people.

Israel, however, has taken steps to reduce significantly the danger from chemical weapons attacks. Three initiatives are involved in this effort. If fully implemented they will significantly reduce the potential effectiveness of Syria's use of chemical weapons.

First, the Israelis have acquired gear to protect soldiers and civilians against chemical agents. Special efforts have been made to protect critical military installations. Israeli air bases are among the best protected in the world, and can operate even after a chemical attack by providing environmental protection systems for aircraft shelters and hangars.

Israel is one of the few countries in the world to provide chemical defense gear to its entire population and drills are conducted periodically to train civilians to respond to chemical attacks. Although civil defense capabilities are not perfect, Israeli civilians have access to a level of protection found nowhere else in the region.

Second, the Israelis have the ability to mount retaliatory chemical strikes. Syrian military operations against Israel are therefore likely to be severely impeded if Israel uses poison gas. Although the Soviets have provided the Syrians with a considerable amount of protective gear against chemicals, it is unlikely that the Syrians could mount offensive operations under chemical conditions. Even their ability to conduct defensive operations would be called into question. Missile batteries and radar sites contaminated by chemical agents may be difficult to operate and repair.

Third, Israel has made it clear that Syrian use of chemical weapons, especially against civilian targets, is likely to result in massive retaliatory conventional attacks. Israel is one place where the outside world is likely to know very quickly of poison gas attacks. Images of civilians killed or wounded by chemical agents are likely to have a dramatic impact and would provide a compelling justification for severe Israeli reprisal raids against Syria. Hence, the use of chemicals would make sense only if Syria thought that it could prevent such retaliatory strikes from taking place, which is not now a very likely prospect.

Equally important, the current strategic environment tends to mitigate against Syrian use of chemical weapons. Syria's leaders believe that they must achieve strategic parity before they will be able to launch an all-out military attack against Israel. They recognize that they have not yet achieved strategic parity with Israel. As a result, most military experts agree that during the next few years a Syrian attack on Israel is most likely to have limited objectives.

So long as the Syrians fight for limited objectives, they are unlikely to employ chemical weapons. Launching chemical attacks on population centers would automatically convert a nominally limited war into a total war, undermining the intended strategic result. Certainly, Israel's leaders have made it quite clear that they would retaliate harshly in response to any use of

chemical weapons against civilians. Even a chemical attack aimed at tactical or strategic military targets that caused civilian casualties would provoke massive Israeli retaliation. Given Israel's small size, it would be difficult to contain the effects of a chemical strike. Israel's sensitivity to the loss of life, together with the association of chemical weapons with the Holocaust, would ensure a swift, disproportionate response.

Even if no civilian casualties result from the use of chemical agents, it is not clear that Syria would benefit from the introduction of chemical agents on the battlefield where ground forces are engaged in combat. Although the effectiveness of Israeli troops is likely to be reduced if they are subjected to chemical attacks, the use of chemicals in a constricted area like the Golan Heights poses problems for the Syrians as well. Even if Israel did not retaliate with its own chemical attacks, Syrian troops would inevitably be affected by their own poison gases and would have to don their chemical protective gear. This would make it harder for Syrian troops to sustain an offensive.

More ominously for the Syrians, should Israel retaliate by launching chemical attacks against advancing armored columns, supporting artillery units, and air defense units, it is likely that the Syrian offensive would grind to a halt. Israeli chemical attacks on radars, surface-to-air missile batteries, and anti-aircraft artillery could open the way for devastating Israeli air strikes on Syrian ground forces.

Syria is most likely to employ chemical weapons at the start of an all-out war intended to inflict a decisive military defeat on Israel. Yet, even under such circumstances, the Syrians are likely to attack cities only to disrupt the mobilization of reserves. Until they have neutralized critical military targets, and especially air bases, they have little reason to divert their chemical attacks onto population centers. Massive attacks on civilian areas might kill a great many people, but will not by themselves win a war.

At the same time, restraint would benefit the Syrians. So long as Syria could threaten Israel with the use of poison gas, Israel would have powerful incentives to prevent a limited war from escalating out of control. By threatening to use chemical weapons the Syrians can constrain Israeli action, preventing attacks on critical strategic installations in Syria's heartland.

Syria's chemical weapons program is also an answer to the Israeli nuclear capability. It is a guarantee against total Syrian defeat. So long as Israel has to worry about the Syrian use of chemical weapons, Damascus will not be in jeopardy. Hence, the chemical weapons in essence limit Israeli freedom of action and ensure Syria against military defeat. The availability of chemical agents to the Syrians will force Israeli decision-makers to act in ways that take account of the possibility of chemical warfare breaking out.

In the next few years, however, this equation will be altered as a growing number of countries acquire ballistic missiles armed with chemical warheads. Such missiles can be made operational in a short period of time and can fly long distances in only a few minutes. When Iraq and Libya have weapons of this type it will become considerably more difficult to maintain stability in the region.

THE PROSPECTS FOR ARMS CONTROL

The United States has adopted initiatives of two kinds in its efforts to stop the spread of chemical weapons. First, it has joined with other Western nations in a cooperative effort to prevent countries in the Third World from acquiring chemical warfare capabilities. This has involved controls on the sale of manufacturing equipment and the supply of the chemical precursors required in the production of chemical agents. Second, it has proposed arms control initiatives that would eliminate existing stockpiles of chemicals.

Operating under the auspices of the "Austrian group," which has 16 members, the United States has made efforts to prevent countries like Iraq from obtaining manufacturing equipment and precursors. These countries have adopted regulations to control the export of materials that could be used in the production of chemical weapons. For example, the United States has issued regulations that prohibit the transfer of certain precursors to Iran, Iraq, or Syria. Similarly, attempts have been made to stop the flow of manufacturing equipment to these countries that could be used in the production of chemical agents.

These efforts to control the proliferation of chemical weapons have failed. At least three countries in the region, Iran, Iraq, and Syria, have acquired a significant ability to manufacture chemical agents in the past five years and a fourth country, Libya, is on the verge of doing so. Intensive efforts by the United States and its allies have not kept these countries from acquiring the specialized production equipment needed to make poison gases.

Attempts to limit production of chemical agents through restrictions on the flow of chemicals needed to make poison gases have also failed. In addition, even if it were possible to prevent proliferating countries from obtaining precursors, this would not matter since they can make the precursors themselves.

To a certain extent, the failure of the United States and its allies to prevent the spread of chemical weapons results from the intractability of the problem. Much of the technology and many of the chemicals have legitimate uses. For example, the production of phosgene gas for commercial purposes in the United States amounts to one million tons a year.

Because of the substantial legal market for the chemicals used to manufacture chemical agents, it is difficult to prevent countries like Iraq and Libya from obtaining them through

subterfuge. The profits involved in these transactions are substantial and many brokers are willing to violate export laws.

Moreover, because the technology is similar to that involved in the manufacture of other chemical substances it is difficult to detect chemical production facilities. Indeed, a factory making nerve gases may look identical to one making pesticides. The only difference evident to the outside observer might be the high security associated with a chemical weapons plant.

Despite the difficulties, more could have been done to prevent the transfer of production facilities and chemicals to proliferating countries. Most of the technology used to make chemical agents originally came from Western Europe or Japan. Even after it was widely known that countries in the Middle East were actively seeking to acquire chemical agents, companies and individuals in Western Europe and Japan continued to provide equipment and chemicals to Iraq, Libya, and Syria.

The failure of some of our closest allies to monitor the activities of their own nationals in the past few years is a scandal of major proportions. This was suggested recently by Tariq 'Aziz, Iraq's Foreign Minister:

If Iraq or Iran or any other Third World state is suddenly in a position to produce chemical weapons, it is clear that the raw materials and facilities were obtained from industrial countries. Europe is the main source in this respect. For Europe to be outraged and shed crocodile tears is pure hypocrisy.⁹

The prospects for arms control in the area of chemical weapons are equally poor. Existing arms control agreements in this area have not been successful. Egypt, Iran, Iraq, Israel, and Libya are all signatories to the Geneva Protocols of 1925 prohibiting the use of chemical agents but that did not stop them from making use of chemical weapons.

Several of the chief proliferators are countries that are not generally considered responsible members of the international community. Iran, Iraq, Libya, and Syria have all been identified by the United States as nations that sponsor international terrorism. Under the circumstances, it is difficult to believe that any country in the region would implement arms control regimes requiring them to destroy their inventories of chemical weapons.

It also should be stressed that the ability of the United States to induce countries in the region to abandon poison gas is limited at best. Several countries, including Iran, Libya, and Syria, are hostile to the United States, and our relationship with Iraq is brittle at best.

Even our friends in the Middle East are unlikely to be receptive to efforts to ban chemical munitions. Both Egypt and Israel appear to rely on chemical weapons to provide a retaliatory capability and as long as other countries in the region possess such weapons they are likely to be reluctant to abandon one of their chief responses to chemical attacks. Moreover, the behavior of the international community during the Iran-Iraq War provides little reason for either country to believe that countries initiating the use of poison gas are likely to be punished.

The effectiveness of an arms control regime is dependent on its enforceability. Monitoring chemical inventories is difficult at best so that much would depend on the willingness of countries in the region to accept intrusive examination of suspected stockpiles. It is unlikely that any country in the area would willingly accept such an agreement.

Arms controls also depend on the effectiveness of the sanctions imposed against violators. Experience over the past 25 years provides little reason to believe that the international community would take serious steps to punish a country found to be stocking or using chemicals. It will

probably be difficult to convince anyone in the region of the worth of an arms control agreement dependent on the effective enforcement of international sanctions.

These observations suggest that we should have a realistic attitude about what could be achieved through such efforts. Under the best circumstances it will not be easy to negotiate with countries in the region to obtain a verifiable and acceptable chemical arms agreement.

At the same time, there are important benefits to be gained from arms control initiatives. The effort involved in negotiating treaties can produce valuable benefits, even if no agreement is reached, by molding international attitudes toward the use of such weapons. The most powerful potential disincentive against the use of chemical and biological weapons is the hostility of the international community. Sanctions will be effective only if there is a widespread willingness to enforce rules and regulations.

U.S. POLICY OPTIONS

Stopping the proliferation of chemical and biological weapons will be a major focus of U.S. foreign policy. George Bush emphasized that "one of my highest priorities as president will be to deal with this terrible scourge."¹⁰ A firm commitment from the president and other high officials is a prerequisite if progress is to be made.

First, efforts to hinder the transfer of production technology and of chemical precursors to countries making chemical weapons should be continued. Factories deteriorate especially when making substances as corrosive as chemical agents. Hence, countries making chemical agents will remain in the market for the specialized equipment and for chemicals. This will not prevent countries from making chemical weapons. However, by making it difficult to acquire such materials the rates of production can be slowed and the costs can be increased.

Second, the United States should continue to promote international agreements to strengthen the 1925 Geneva Protocol. The process of negotiating such accords helps define international opinion and it is in everyone's interest that chemical and biological weapons continue to be outlawed.

At the same time, we should be realistic about the difficulties of achieving a verifiable ban on the production and the use of chemical weapons. A treaty that shields potential violators, by allowing them to conduct activities under the protective cover of an arms control agreement, may be worse than no agreement at all. The difficulties inherent in efforts to identify production facilities are well known but it may be even harder to prove the use of chemical weapons.

Third, the United States should assist its allies in the Middle East to acquire defenses against chemical weapons. Since defensive gear can substantially reduce the effectiveness of chemical agents, its availability will diminish the temptation to use poison gases against our friends in the region. These efforts should focus on countries that do not possess chemical agents in order to reduce the incentives for those nations to acquire such weapons.

Fourth, the United States should provide assurances that it will militarily support friendly countries attacked by chemical or biological weapons. This would reduce the incentives for the use of such weapons against our friends. In addition, we should make it clear that the United States will not restrain conventional retaliation by any of our allies subjected to chemical or biological attacks

Fifth, the United States should assign a high priority to bilateral negotiations with the Soviet Union intended to enhance efforts to control the proliferation of chemical weapons. The Soviet Union has repeatedly expressed alarm over the spread of such weapons. This could

indicate a willingness by the Soviets to work with the United States to address this problem. The countries in the Middle East most likely to use chemical weapons, Iraq, Libya, and Syria, maintain close relations with the Soviet Union and may be susceptible to pressure from Moscow.

Sixth, the Congress should increase its oversight of the issue. It should require mandatory reporting from executive agencies, on a classified basis if necessary, of developments in the proliferation of chemical and biological agents. In addition, to inhibit the future use of these weapons strict sanctions should be legislated against countries known to be using chemical or biological agents. These sanctions could be similar to those imposed on countries involved in terrorism.

Seventh, the United States should continue to promote efforts to hinder the proliferation of missiles that could be used to deliver chemical or biological agents at long ranges. This requires continued enforcement of the provisions of the Missile Technology Control Regime and bilateral negotiations. In addition, the Congress should consider enacting legislation to impose sanctions on Western companies with access to American technology that are involved in the proliferation of ballistic missiles. *W*

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The views expressed in this research memorandum are those of the author and should not be taken as necessarily representing the opinions of the Board of Trustees of the Washington Institute.

END NOTES

1. The account that follows is based on a variety of sources. Background is provided by a five volume work produced by the Stockholm International Peace Research Institute (SIPRI), *The Problem of Chemical and Biological Warfare* (New York: Humanities Press, 1971). The *Christian Science Monitor* provided an excellent survey of the current trends in a series of articles that appeared December 13-16, 1988. The best single source of information on chemical warfare in the Middle East is a BBC documentary, "The Secrets of Samarra," released in 1986 but never shown in the United States, and a related story by Herbert Krosney, "Poison Gas: Iraq's Deadly Weapon of Last Resort."
2. Interview in Cairo *Al-Musawwar* (Arabic), May 20, 1988, as translated by FBIS, *Daily Report: Near East and South Asia*, May 20, 1988, pp. 18-19.
3. "Is Baghdad Using Poison Gas?," *Newsweek*, March 19, 1984, pp. 39-40.
4. Tehran *IRNA* (English), October 19, 1988, as reported in FBIS, *Daily Report: Near East and South Asia*, October 19, 1988, pp. 55-56.
5. *Damascus Television Service* (Arabic), March 23, 1988, and *Damascus SANA* (Arabic), March 24, 1988, as translated by FBIS, *Daily Report: Near East and South Asia*, March 29, 1988, pp. 49-50.
6. *Argumenty IFakty* (Russian), September 3-9, 1988, p. 2, as translated by FBIS, *Daily Report: Soviet Union*, September 2, 1988, pp. 6-7.
7. Bill Gertz, *Washington Times*, December 13, 1988, p. A5. Webster made a similar statement on October 25, 1988, as reported by David B. Ottaway, *Washington Post*, October 25, 1988, p. A2.
8. SIPRI, *The Problem of Chemical and Biological Warfare*, Vol. II, p. 241.
9. Interview in *Der Spiegel* (German), November 14, 1988, as translated in FBIS, *Daily Report: Near East and South Asia*, November 15, 1988, p. 21.
10. Speech given at the University of Toledo (Ohio) on October 21, 1988.

GLOSSARY

- **Biological Warfare** — The use of bacteria and viruses to incapacitate or kill people or animals. Among the organisms known to be used for biological warfare are bacteria like plague, anthrax, and cholera. Some biological agents, like anthrax, are lethal in small doses, killing the victims in a short period of time if they are not promptly given medical treatment. Many biological agents become ineffective soon after they are released into the environment, but others may not disappear for decades.
- **Chemical Warfare** — The use of chemical substances to kill or incapacitate people or animals. Among the chemical agents that have been used are mustard gas, nerve gas, and phosgene.
- **Mustard Gas** — A chemical agent, first used in World War One, that causes severe blistering. In severe cases it can cause death. Normally spread in small droplets, it can persist for extended periods of time. It is still considered highly effective and most countries with chemical agents possess at least some stocks of mustard gas. Iraq used it extensively during the Gulf War.
- **Nerve Gas** — These substances interfere with the functioning of the nervous system, causing death in a matter of minutes. Nerve agents include substances like Sarin (GB), Tabun (GA), and VX. The first nerve agents were developed by Germany before the Second World War.
- **Phosgene** — This is produced for legitimate commercial purposes, but also can be used as a chemical agent. When used as a gas it causes choking, nausea, and fatigue. It can be lethal.
- **Sarin** — A type of nerve gas. It evaporates rapidly and is therefore considered to be non-persistent.
- **Tabun** — A type of nerve gas. It is more persistent than Sarin.
- **Toxins** — Poisons, produced either chemically or biologically, capable of incapacitating or killing.
- **VX** — A type of nerve gas, usually used in a liquid form. It persists for an extended period of time.

CHEMICAL AND BIOLOGICAL WARFARE CAPABILITIES IN THE MIDDLE EAST

<u>Country</u>	<u>Chemical</u>	<u>Biological/Toxins</u>	<u>Use</u>
EGYPT	Acquired an ability to use chemical agents in the early 1960s. By 1973 it was producing weapons. Efforts to enhance operational capabilities continued after that and it still produces chemical agents.	By the early 1970s, a rudimentary biological warfare capability was in place.	North Yemen (1963-1967): Chemical agents were used against Royalist forces during Egypt's intervention in North Yemen.
IRAN	Initiated development of a chemical warfare program in response to Iraq's use during the Gulf War. It is working to expand its ability to manufacture agents.	Appears to be developing biological agents in response to Iraq's program.	Gulf War (1987-1988): It appears that by 1987 the Iranians were employing small quantities of chemical agents, possibly captured from the Iraqis.
IRAQ	Initiated efforts to manufacture chemical agents in the mid-1970s, and achieved a production capability in the early 1980s. It has the capacity to make 1,000 tons of chemical agents per year.	Believed to have an operational biological warfare capability. It probably has a program to make toxins and should be assumed that it is researching advanced biological agents.	Gulf War (1983-1988): According to the Iranians, as many as 45,000 Kurds and Iranians were killed or injured by Iraqi use of chemical agents, the most extensive use of them since the First World War.
ISRAEL	A chemical program was started in the 1960s in response to Egypt's use of chemical agents in North Yemen. By 1973, it had an operational capability. Currently, it has mustard gas and is producing nerve agents.	No known biological warfare capability, but is generally presumed capable of developing one in a short period of time.	Israel has never used chemical agents.
LIBYA	Obtained chemical agents in 1987, apparently from Iran. Construction of a large chemical manufacturing facility is nearing completion.	No known capability.	Chad (1987): It used chemical agents against Chadian military forces at once.
SYRIA	Received its first chemical agents from Egypt just before the 1973 Arab-Israeli War. Currently manufactures nerve agents and other chemicals. It possesses chemical warheads for its SCUD B ballistic missiles.	Believed to possess an operational biological warfare capability. It may be researching advanced biological agents and toxins.	Syria has never used chemical agents.

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