S. HRG. 107–573

THE WEAPONS OF MASS DESTRUCTION PROGRAM OF IRAQ

HEARING

BEFORE THE

SUBCOMMITTEE ON EMERGING THREATS AND CAPABILITIES

OF THE

COMMITTEE ON ARMED SERVICES UNITED STATES SENATE

ONE HUNDRED SEVENTH CONGRESS

SECOND SESSION

FEBRUARY 27, 2002

Printed for the use of the Committee on Armed Services

U. S. DEPOSITORY

AUG 2 2 2002

U.S. GOVERNMENT PRINTING OFFICE

80–791 DTP WASHINGTON : 2002

For sale by the Superintendent of Documents, U.S. Government Printing Office
Internet: bookstore.gpo.gov Phone: toll free (866) 512–1800; DC area (202) 512–1800
Fax: (202) 512–2250 Mail: Stop SSOP, Washington, DC 20402–0001

Digitized by Google

Original from
UNIVERSITY OF CALIFORNIA

COMMITTEE ON ARMED SERVICES

CARL LEVIN, Michigan, *Chairman*

EDWARD M. KENNEDY, Massachusetts	JOHN WARNER, Virginia
ROBERT C. BYRD, West Virginia	STROM THURMOND, South Carolina
JOSEPH I. LIEBERMAN, Connecticut	JOHN McCAIN, Arizona
MAX CLELAND, Georgia	BOB SMITH, New Hampshire
MARY L. LANDRIEU, Louisiana	JAMES M. INHOFE, Oklahoma
JACK REED, Rhode Island	RICK SANTORUM, Pennsylvania
DANIEL K. AKAKA, Hawaii	PAT ROBERTS, Kansas
BILL NELSON, Florida	WAYNE ALLARD, Colorado
E. BENJAMIN NELSON, Nebraska	TIM HUTCHINSON, Arkansas
JEAN CARNAHAN, Missouri	JEFF SESSIONS, Alabama
MARK DAYTON, Minnesota	SUSAN COLLINS, Maine
JEFF BINGAMAN, New Mexico	JIM BUNNING, Kentucky

DAVID S. LYLES, *Staff Director*
JUDY A. ANSLEY, *Republican Staff Director*

SUBCOMMITTEE ON EMERGING THREATS AND CAPABILITIES

MARY L. LANDRIEU, Louisiana, *Chairman*

EDWARD M. KENNEDY, Massachusetts	PAT ROBERTS, Kansas
ROBERT C. BYRD, West Virginia	BOB SMITH, New Hampshire
JOSEPH I. LIEBERMAN, Connecticut	RICK SANTORUM, Pennsylvania
BILL NELSON, Florida	WAYNE ALLARD, Colorado
JEAN CARNAHAN, Missouri	TIM HUTCHINSON, Arkansas
MARK DAYTON, Minnesota	SUSAN COLLINS, Maine
JEFF BINGAMAN, New Mexico	JIM BUNNING, Kentucky

Digitized by Google
Original from
UNIVERSITY OF CALIFORNIA

J
60
A75
107th
no. 11
main

CONTENTS

CHRONOLOGICAL LIST OF WITNESSES

THE WEAPONS OF MASS DESTRUCTION PROGRAM OF IRAQ

FEBRUARY 27, 2002

	Page
Cordesman, Dr. Anthony H., Arleigh Burke Chair and Senior Fellow, Strategic Assessment, Center for Strategic and International Studies	7
Duelfer, Charles A., Visiting Resident Scholar, Center for Strategic and International Studies	92

Digitized by Google
Original from UNIVERSITY OF CALIFORNIA

Digitized by Google

Original from
UNIVERSITY OF CALIFORNIA

THE WEAPONS OF MASS DESTRUCTION PROGRAM OF IRAQ

THURSDAY, FEBRUARY 27, 2002

U.S. SENATE,
SUBCOMMITTEE ON EMERGING THREATS
AND CAPABILITIES,
COMMITTEE ON ARMED SERVICES,
Washington, DC.

The subcommittee met, pursuant to notice, at 2:37 p.m. in room SR–222, Russell Senate Office Building, Senator Mary L. Landrieu (chairman of the subcommittee) presiding.

Committee members present: Senators Landrieu, Bill Nelson, Bingaman, Roberts, Hutchinson, and Collins.

Committee staff member present: David S. Lyles, staff director.

Majority staff members present: Evelyn N. Farkas, professional staff member; and Richard W. Fieldhouse, professional staff member.

Minority staff members present: Charles W. Alsup, professional staff member; and Edward H. Edens IV, professional staff member.

Staff assistants present: Thomas C. Moore and Nicholas W. West.

Committee members' assistants present: Menda S. Fife, assistant to Senator Kennedy; Christina Evans, assistant to Senator Byrd; Marshall A. Hevron and Jeffrey S. Wiener, assistants to Senator Landrieu; William K. Sutey, assistant to Senator Bill Nelson; Neal Orringer, assistant to Senator Carnahan; Brady King, assistant to Senator Dayton; George M. Bernier III, assistant to Senator Santorum; Robert Alan McCurry, assistant to Senator Roberts; James P. Dohoney, Jr., assistant to Senator Hutchinson; Kristine Fauser, assistant to Senator Collins; and Derek Maurer, assistant to Senator Bunning.

OPENING STATEMENT OF SENATOR MARY L. LANDRIEU, CHAIRMAN

Senator LANDRIEU. The Subcommittee on Emerging Threats and Capabilities will come to order. This hearing today is on Iraq's weapons of mass destruction program. I would like to welcome our distinguished panel that is with us today and thank all those who helped make this very timely hearing possible and successful, in advance of it happening. I am sure that what we learn today will be very helpful to us as policymakers.

This is the first hearing of our subcommittee for this year. I am pleased to be here with my partner and Ranking Member, Senator Pat Roberts, to continue this subcommittee's important work in

Digitized by Google
Original from UNIVERSITY OF CALIFORNIA

identifying the urgent threats to our security, and the capabilities we need to meet these threats.

This subcommittee, started under Senator Roberts' able chairmanship, has focused on threats that were once considered emerging, or more remote in some people's minds, even hypothetical, but we held hearings and pressed on in 1999 and in 2000 in combating terrorism, preventing proliferation, and even in 1999 on biological weapons aimed at U.S. agriculture.

Last year, 4 months before September 11, we held a hearing on the military's ability to respond to domestic terrorist attacks using weapons of mass destruction, and in the winter we addressed issues of bioterrorism and terrorist motivations. We learned through those hearings, but more pointedly we learned on September 11, that these threats have, indeed, emerged.

Because of our scheduling today, I am going to ask Senator Roberts if he would go first with his opening statement. I will follow, he will be able to submit some of his questions in writing, and then we will proceed. He has an Intelligence Committee meeting that is running concurrent with this one, so at this time, I will recognize Senator Roberts.

STATEMENT OF SENATOR PAT ROBERTS

Senator ROBERTS. Thank you, Madam Chairwoman, and I apologize to you and to the witnesses. I am doing a mea culpa that I said I would never do, and that is to abdicate early, but we do have an Intelligence Committee meeting in reference to Saudi Arabia. I had already actually prepared some specific questions for the witnesses that are there at this time, so I apologize to you, and I want to thank you for your leadership in holding this hearing. I want to thank the witnesses for taking time out of your very valuable schedules to come and testify.

It is always helpful to hear from informed experts about the situation in Iraq. Over 15 years ago, a prominent U.S. news magazine ran a picture of Saddam Hussein on its cover with the caption, "Most Dangerous Man in the World." Despite a long war with Iran in the mid–1980s, a devastating defeat by the United States in 1991, major revolts by the Kurds and the Shiite elements within his country, numerous coup attempts, wary neighbors, and a constant international application of sanctions, Saddam Hussein remains in power and continues to develop all of the weapons of mass destruction, threatening his own citizens and neighbors in the world.

In his State of the Union Address to the Nation on January 29, President Bush included Iraq as part of the now well-known axis of evil, along with Iran and North Korea. I understand that many, including some of our European allies, had some frustration and concern with this. Some even were very quick to criticize the President for applying this brand, suggesting that such a declaration is dangerous and provocative.

Let me remind all those folks that President Reagan was heavily criticized when he labeled the Soviet Union an evil empire. I believe his words of resolve helped lead to the demise of the Soviet Union and the end of the Cold War, so I salute the President for

Digitized by Google
Original from UNIVERSITY OF CALIFORNIA

having the courage to decisively confront the new evils that we face in this new century.

I might add that having traveled with the President to Denver just a short time ago to talk to the American cattlemen, before he was on his way to Salt Lake City—and I do not think I am revealing any presidential classification here—he has no intent to "go to war with Iraq." He simply indicated that he has informed the three countries that we know what they are doing, and they now know what we know. We know much of what they do in aiding and abetting the transnational terrorist organization sworn to kill us and to do great damage to western civilization. That is not permissible, and there will be a price to pay.

Saddam Hussein and his regime, in my personal view, are evil and threatening. They use terror, torture, and weapons of mass destruction on their own people. They support terrorism around the world, and they continue to develop and proliferate weapons of mass destruction.

I often ask witnesses what threats are so ominous that they keep them awake at night, and in this particular case I am going to answer my own question. This time, one of the things that does keep me awake is the thought that this evil man, Saddam Hussein, does possess weapons of mass destruction and the means to effectively deliver them, as our witnesses I think will testify to.

From 1991 to 1998, the United Nations Special Commission on Iraq, of which Mr. Duelfer was an integral part, did make considerable progress in the monitoring and the dismantling of Iraq's WMD capability. In late 1998, however, as we all know, Iraq became increasingly defiant and stopped this cooperation with the weapons inspections, in defiance of the UN, in violation of its own pledge. Because of that refusal to cooperate, the U.S. attacked Iraqi WMD sites in December of 1998 in a military operation called Operation Desert Fox. This operation did attack over 90 targets, mostly missile-related.

I am not sure how effective this attack really was. By all accounts, the Iraqi efforts in increasing their capability of weapons of mass destruction have continued without any oversight over the last 4 years, and may well be accelerating.

Our two witnesses have closely followed the developments in Iraq and the Middle East, and are well-qualified to bring us up-to-date on the recent developments. Thank you again for your willingness to testify. We look forward to your comments and a productive discussion.

I would add only this in regards to what I have to say, Madam Chairwoman, and I again apologize for having to leave, but Dr. Cordesman has great expertise in NATO, and I thought either the full committee or the subcommittee could have him back. I think NATO is a very timely subject, and I look forward to visiting with him about NATO, but in reading his testimony, one of the things he points out is that the Gulf War did surprisingly little damage to Iraq's missile program or any of its chemical, biological, radiological, and nuclear programs.

Second, he points out that they have lied to the UN and the world every time it was suitable for them in regards to increasing the probability that they would use these kinds of weapons. He also

Digitized by Google

Original from
UNIVERSITY OF CALIFORNIA

points out that Iran's conventional weakness pushes it toward the threat or use of chemical, biological, radiological, and nuclear (CBRN) weapons, and Saddam Hussein took massive risks involved. So he thinks if Saddam is in a more weakened state that perhaps it increases the risk of some attack, and then he also said Iraq may have the capability to attack agriculture as well as humans. I, for one, have been trying to convince this administration and my colleagues in the past administration of the danger of agriterrorism. It is so easy to do, and I want to thank you for including that in your testimony.

Finally, the U.S. cannot count on Iraq ceasing to proliferate simply because of regime change. So much of the time we hear, Madam Chairwoman, that if we aid and assist in a change of regime, it automatically assumes that this threat would be lessened. As Dr. Cordesman has pointed out, that may be true, but it also may not be true.

On the very last page of Mr. Duelfer's testimony, here is what Saddam says: "If the world tells us to abandon all of our weapons and keep only our swords, we will do that. We will destroy all the weapons if they destroy all their weapons. But if they keep a rifle and then tell me I have the right to possess only a sword, then we would say no. As long as the rifle has become a means to defend our country against anybody who may have designs against it, then we will try our best to acquire the rifle." We all know what "the rifle" means in regards to what their capability would be.

Mr. Duelfer goes on to say, as our other witness did also, of course, that the difference in the regime is everything. The present regime in Baghdad will not give up their weapons of mass destruction, even if inspectors go in again. The present regime will also remain quite willing to use them. Now, that is not an emerging threat, that is a threat.

So with those comments, Madam Chairwoman, I again apologize, and I thank the witnesses.

Senator LANDRIEU. Thank you, Senator Roberts, and I want to thank you for your able leadership over the last several years. I appreciate the contribution that you continue to make to this subcommittee's work.

Let me begin by just reviewing very briefly the focus of our subcommittee for this year, because it goes without saying that we are living in dangerous times. It is the mission of this subcommittee to focus first on the likely threats that we face, not just the likely threats, but every threat, and second, on our capabilities, or the capabilities that our military and our Nation need to protect us from those threats. We will help our Congress through the work of this subcommittee to hopefully fashion our defense budgets to reflect the realities of those threats, and the capabilities that are necessary.

In our subcommittee hearings over the next several weeks, therefore, we will focus on the most urgent threats—proliferation and terrorism. We will explore how our Armed Forces can build their capabilities to more effectively counter extremists and groups who would strike out against Americans using weapons of mass destruction or conventional terrorism on the scale of the September 11 attacks.

Digitized by Google
Original from UNIVERSITY OF CALIFORNIA

We will explore the capabilities of U.S. nonproliferation programs that are designed to reduce the likelihood that foreign nuclear, chemical, or biological weapons materials or the scientists with knowledge of weapons will fall into the hands of other nations or terrorist entities. We will look at the tremendous, unique capabilities of our Special Operations Forces in the current war and their potential future roles. We will also consider the capabilities of the chemical and biological defense programs that are meant to protect our military and our Nation against such deadly agents as anthrax.

Finally, we will examine how the sum total of our military's capabilities can be harnessed by technology to transform our Armed Services into a 21st century force that is designed to meet these urgent and future threats. It is this subcommittee's formidable task to help allocate resources for programs in a way that help our Armed Forces respond to these threats appropriately and, I might say, effectively.

In his State of the Union Address, President Bush indicated a particular concern for two threats that we face: international terrorism and proliferation of nuclear, chemical, and biological weapons, also known as weapons of mass destruction. The two phenomena become linked if states that have access to weapons of mass destruction intentionally or unintentionally make such weapons or technologies available to terrorist groups.

That concern brings us to our meeting today. One of the nations President Bush highlighted in this regard was Iraq. We know, and the testimony by Senator Roberts just recapped and summarized what I am saying, but all we know from members and officials that have testified before this committee and others is that the Government of Iraq used chemical weapons in the 1980s against its own people, the Iraqi Kurds, and against its neighbors. After the Gulf War we learned Iraq had both chemical and biological weapons ready to use, and has made considerable progress in developing nuclear weapons.

During the Gulf War we tried to destroy Iraq's weapons of mass destruction facilities, at least the ones we knew about. After the war, the UN Special Commission on the ground in Iraq learned a great deal more about their programs and were able to oversee the destruction of much of them, but how much they were able to destroy is still subject to debate.

Saddam Hussein never has fully cooperated with UNSCOM, and he kicked them out of Iraq in 1998. Since that time we have had no inspectors in Iraq, no access to their facilities. We have less information now, 3 years later, as to what the situation is, and that is part of what our meeting is about here today.

We do know that the United Nations had sanctions in place for the last decade. Furthermore, various experts and policymakers at one time, including Secretary Powell, have said that without these sanctions it would be easier for Iraq to reconstitute its nuclear, chemical, biological, and missile programs. However, according to a recent statement by the Director of Defense Intelligence, the lack of intrusive inspection and disarmament mechanisms permit Baghdad to enhance WMD programs.

CIA Director George Tenet has also declared that Saddam remains a threat. He is determined to thwart UN sanctions, press

Digitized by Google

Original from
UNIVERSITY OF CALIFORNIA

ahead with weapons of mass destruction, and resurrect the military force he had before the Gulf War. The CIA believes that Iraq is expanding its chemical and biological programs and pursuing other capabilities. There is clearly an urgent need to fully examine and access this particular threat. We should be deeply concerned about Baghdad's capabilities, because this is a state whose president declares that we are wicked and exhorts Arabs to unite and stand up against us.

Saddam Hussein, regardless, is an enemy. That is clear to many of our allies, but the question is what means he is capable of using against us? What weapons could he and would he choose to wield against Americans or America? Finally, would he be willing to make weapons of mass destruction available to our terrorist enemies, and what is the likelihood of that?

Through the testimony of our witnesses today, we hope to paint a clearer picture of this threat of nuclear, chemical, and biological weapons, and have a better assessment of his intentions. Ultimately, this hearing should help us determine the military and intelligence capabilities we need to combat this hostile regime.

On the first panel we are very fortunate to have Tony Cordesman and Charles Duelfer, both from the Center for Strategic and International Studies. Dr. Cordesman has testified before this committee before. He is well-known as a former staff member for Senator John McCain, and he has gone on to distinguish himself in many other ways. He has a solid reputation of tracking the military capabilities of Iraq and its neighbors.

Mr. Duelfer served as Deputy Executive Chairman of the UN Special Commission from 1993 until its termination, so he has first-hand knowledge of the subject that we are exploring today. Currently, he is a visiting resident scholar at the Center. He brings his extensive monitoring and arms control experience to our discussion.

So let me at this point ask Senator Bingaman if he has an opening statement.

Senator BINGAMAN. Madam Chairwoman, I will just wait to hear the witnesses. Thank you.

Senator LANDRIEU. Senator Collins could not stay for the hearing today, but her opening statement will be made part of the record.

[The prepared statement of Senator Collins follows:]

PREPARED STATEMENT BY SENATOR SUSAN M. COLLINS

Thank you, Madam Chairwoman. Today, this subcommittee will hear testimony from individuals representing the Center for Strategic and International Studies and our Intelligence agencies to provide insight into the weapons of mass destruction (WMD) program of Iraq. This issue is an extremely important one. I share the concern of most Americans about the trends and developments associated with the continued proliferation of weapons of mass destruction and the missiles to deliver them, and that is why this hearing is so important.

While Iraq's program is one of several WMD programs that exist today, Iraq's program is believed to be both well-established and hidden at the same time. It is the uncertainty surrounding the depth and capabilities of Iraq's WMD program that concerns me the most.

Although there are uncertainties and unknowns associated with the Iraq WMD program, we do have some knowledge of the facts. First and foremost, it is a known fact that Iraq has had and will continue to proliferate its other weapons of mass destruction and missiles to deliver them. It is also known that this activity has been ongoing since, at least, 1973. Additionally, on the basis of the past experience, the

Digitized by Google
Original from UNIVERSITY OF CALIFORNIA

world's experts conclude that Baghdad has reconstituted its prohibited WMD program, and it is suspected that Baghdad has active chemical and biological weapons programs.

We also know that Iraq has rebuilt portions of its missile production facilities, and has attempted to purchase numerous dual-use items, supposedly for legitimate civilian use. However, I would not be surprised if these dual-use items were being diverted to further Iraq's WMD program capabilities. Iraq is also known to be aggressively pursuing a nuclear capability, and continues to acquire and develop advanced conventional weapons.

With that said, the on-going challenge is to find ways to better understand the capabilities that Iraq currently has, and to determine and explore what strategic options exist to stop this proliferation now and in the future. The more we know, the better we are able to deter and detect terrorist activities similar to the events of 9/11.

I do not believe that we will solve this action today, but I find it encouraging to see the United Nations Security Council and this administration engaged in this issue. I thank you for taking the time to testify before this subcommittee and I look forward to hearing your candid assessments of Iraq's WMD program, and hope to gain some additional insight into measures that can be taken to stop Iraq's proliferation. Thank you, Madam Chairwoman.

Senator LANDRIEU. Thank you. We will begin, Dr. Cordesman, with your testimony.

STATEMENT OF DR. ANTHONY H. CORDESMAN, ARLEIGH BURKE CHAIR AND SENIOR FELLOW, STRATEGIC ASSESSMENT, CENTER FOR STRATEGIC AND INTERNATIONAL STUDIES

Dr. CORDESMAN. Thank you very much, Senator. If you do not mind, I will ask that my formal statement and the attachments be included in the record and will just comment on a few points which I think may serve as an introduction.

One thing we have to remember is that we have made almost three decades' worth of effort to fight proliferation in the Middle East. We may be focusing on current developments; but I can remember going to the battlefields after the October War and finding them covered with chemical defense gear for two sides which were prepared as far back as 1973 to begin a serious chemical war. In fact, Egypt used chemical weapons in Yemen as far back as the 1960s.

Nations like Iran, Iraq, Egypt, Israel, Libya, Syria, and others have now been proliferating consistently for decades, so we are not talking about something which can be tied to a single country or even to a single part of the Middle East, and it certainly cannot be tied to a single type of weapon.

I think, however, that virtually everyone would agree that Saddam Hussein has both been extraordinarily dedicated to proliferation and has been willing to make it the focus of his military capabilities and his state. It is particularly worthwhile, I think, to point out that during the Gulf War Saddam Hussein went so far as to prepare a launch-under-attack capability to use chemical or biological weapons.

It was a crude capability. It involved dispersing weapons where they could be used to arm aircraft, although it may have involved some dispersal of missile warheads. But the fact that he was willing to go this far, and was willing to intermingle chemical and biological weapons with conventional weapons and with very unclear distinctions between types, indicates the level of risk he is willing to take.

Digitized by Google
Original from UNIVERSITY OF CALIFORNIA

One of the key issues we face is that ever since the Israeli raid on Osirak he has demonstrated the ability to disperse his weapons, efforts to conceal them, to create underground and hardened structures with a high level of survivability, and to set up many duplicative efforts. So finding one or even two aspects of Iraq's activities may not reveal the scale of what he has done.

We found out after the Gulf War that everything we said during the Gulf War about destroying his capabilities was wrong. Although the Department of Defense promised several times publicly that it would issue a damage assessment after our new series of strikes in Operation Desert Fox, there has never been any official assessment from the Department of Defense of the effectiveness of the strikes made during that operation. I think that is a warning not only in terms of the limits of military action, but of what inspection can do.

I will not repeat some of the points that Senator Roberts made. I do not think it is worth pointing out in great depth that Saddam Hussein is a liar, but you cannot appreciate the scale of his lies until you read in detail through the UNSCOM reports. Year after year, and report after report, you find the sheer scale of Iraq's commitment to lying and concealing.

These lies have current implications. Even if we get inspectors in again, we might well see a situation where Saddam would sacrifice some limited elements of his capabilities simply to allow the inspectors to find something and then leave. He will certainly disperse his capabilities even further. He might delay his operations in the face of new inspections, but frankly I cannot believe that he would stop.

We should also be aware that there has been in the past far too much focus on Iraqi missiles as a possible system of delivery. It is unlikely to me that if Iraq has a nuclear device it can be lifted by a missile body. Missiles are not a particularly effective way to deliver biological weapons, and there are many other ways that these weapons can be smuggled or used. We need to be very careful to consider the full spectrum of delivery systems.

We should also remember that Iraq's past efforts were designed to fight a theater-wide war against Iran. We have learned the hard way, however, that very small attacks using weapons of mass destruction can be extraordinarily disruptive and costly, and that we cannot really count on seeing visible warning indicators based on any repetition of the massive Iraqi effort that existed in 1990.

There are several other uncertainties I would like to stress. I have heard Saddam always described as somebody who acts on pragmatic logic and risk perceptions. Well, I watched when he invaded Iran, and I watched when he invaded Kuwait, and that is not to me a guarantee of future pragmatism.

We also need to be very careful about the fact that we cannot determine exactly what level of nuclear development has occured in Iraq, or what kind of device and weapon Iraq might use. If Saddam is willing to take risks, to use material with low levels of enrichment, to produce unpredictable levels of yield, or low yield and high radiation, the level of sophistication of such a nuclear device would be far simpler than the kind of sophisticated implosion devices and two weapons designs he had at the time of the Gulf War. I do not

Digitized by Google
Original from UNIVERSITY OF CALIFORNIA

believe it is possible to conceal enrichment systems like centrifuges or diffusion facilities in small cells, but it is at least technically possible.

In the case of biological weapons, we have to remember that 10 years have gone by since the time of the Gulf War. Perhaps Charles can comment, but if they began a now covert effort after the Gulf War, focusing on dry, storable weapons, it is extremely unlikely that we could detect it. Such an effect could be very small and we know from past experience with wet biological agents that civilian facilities could be converted virtually from zero to mass production of the facilities in less than 6 months.

I raise these points because when we talk about inspection I do not mean to imply that they might not be useful, but I think there is zero probability that new UN inspections could detect efforts of this kind, much less an effort to break out or suddenly deploy small amounts of chemical weapons like the VX to arm a few missiles.

Iraq does not have an extensive known history of using terrorist organizations as proxies. I should comment, however, that this is a region filled with conspiracy theories, and with so many conspiracy theories it is certainly possible that Iraq will have conspiracies.

One thing that also concerns me, partly because the Israelis constantly raise the issue, is the possibility that Iraq might this time attack Israel if it came under U.S. or other attack simply to try to drag it into a much broader war, and to complicate the situation or simply to poison the well in the aftermath of a broader conflict.

I think we face four other major uncertainties. One is whether we can contain Iraq successfully once it slowly and systematically builds up its weapons of mass destruction. I do not believe the issue is the exact level of Iraqi capabilities today. I think it is the fact that the situation is virtually certain to deteriorate steadily over time.

Second, I mentioned the issue of inspection. I simply see no possibility that any form of inspection without almost transparent human intelligence and full access to what the leadership knows would uncover a biological effort. You cannot prevent the technology base from existing, and in some areas like biological weapons you can reconstitute the effort virtually from zero in a matter of months.

Third, I really am not sure what our targeting capabilities are. I have not seen recent evidence that we are better off today in our ability to find and target dispersed Iraqi weapons efforts and have a counterproliferation strike than we were, say, in 1991 or 1998.

Finally, a point about regime change. I think any regime for Iraq would be better than Saddam Hussein. There is a very real possibility that if we acted in the aftermath of a war to overthrow Saddam, to create a stable Iraq, to help it develop, to create more democratic regimes, we would have a much better regime than Saddam Hussein. However, let me go back to history. For almost three decades, Iran, Iraq, Syria, Israel, and Libya have proliferated, and we now have Pakistan and India indirectly in the equation, so we need to be careful. Proliferation may or may not stop if Saddam goes.

Thank you.

[The prepared statement of Dr. Cordesman follows:]

Digitized by Google

Original from
UNIVERSITY OF CALIFORNIA

PREPARED STATEMENT BY DR. ANTHONY H. CORDESMAN

At this point in time, no unclassified source can hope to accurately characterize Iraq's current holdings of weapons of mass destruction or the rate at which it can improve its present capabilities. At the same time several facts are clear. Iraq has a long and well-documented history of acquiring and using weapons of mass destruction. (This history is summarized in Attachment One.) In fact, proliferation has now been a major Iraqi objective for well over a quarter of a century.

IRAQ'S HISTORY OF PROLIFERATION

Iraq's attempts at proliferation date back to at least the time of the October War in 1973, and it actively sought nuclear weapons for several years before the Israeli strike on its Osriak reactor in 1981. It stepped up its efforts to acquire chemical and biological weapons after it suffered its first serious round of reversals in the Iran-Iraq War in 1982, rushed to use chemical weapons as soon as it could deploy initial amounts of mustard gas, and escalated to far more serious uses of chemical weapons before the Iran-Iraq War ended.

It chose to use chemical weapons against its own Kurds when some supported Iran. It rushed biological weapons forward at the same time, and it seems virtually certain that it would have used them if it had not defeated Iran so decisively in the spring of 1988. It rushed extended range Scuds into deployment and conducted a major missile campaign against Iran's cities, developed chemical and biological warheads for its missiles, and develop a family of much longer-range/higher payload missiles.

Iraq prepared to make massive use of chemical weapons during the Gulf War in 1990–1991, and disbursed its biological weapons so that they could be used in air strikes. It carried out a major series of conventional missile strikes on Israel and Saudi Arabia and prepared a "launch under attack" option to use chemical and biological weapons if the leadership was threatened or saw a broad defeat as inevitable. It rushed forward its nuclear program, attempting to build at least a few weapons by the early 1990s. It refined biological weapons for agricultural attacks as well as attacks on human beings and looked at alternative means of delivery such as drones, crop sprayers, and helicopters.

Sustaining these programs during the 1980s and through 1991 cost tens of billions of dollars at times when Iraq was effectively bankrupt and dependent on other Gulf states for its financial and military survival. The programs were massive in scale, and involved the development of delivery systems with far longer-ranges than were needed simply to cover Iran. They were part of an equally massive conventional military build-up, and seem to have been directed at regional dominance, not simply the defeat of Iran and invasion of Kuwait. They clearly would have given Iraq a capability to target Israel and Turkey and every U.S. base in the region with the exception of Diego Garcia.

The Gulf War did surprisingly little damage to either Iraq's missile programs or any of its chemical, biological, radiological, and nuclear (CBRN) programs. The most damaging single U.S. strike was an accident when an aircraft struck a secondary target selected for other purposes. The U.S. lacked the ability to effectively target Iraqi CBRN and missile facilities and forces because of the highly covert nature of Iraq's programs—a problem the U.S. had not solved when it carried out equally ineffective strikes in December 1998 as part of Operation Desert Fox—and in spite of 8 years of UNSCOM inspections.

Ever since the end of the Gulf War, Iraq has made its missile and CBRN programs its highest single national priority. It has been willing to accept more than a decade of continued UN sanctions, to suffer follow-on U.S. and British air strikes, to cripple its economic development and cause massive suffering for its people, and see its conventional forces massively deteriorate because of its lack of conventional arms imports. (The cost and nature of the deterioration in Iraq's conventional forces is shown in Attachment Two). In fact, there are strong indications that Iraq not only did everything possible to retain its pre-Gulf War capabilities in spite of UNSCOM inspections, but created new, highly compartmented, black programs in case UNSCOM could succeed in tracking down all of the programs it had in place in 1991.

Iraq has lied to the UN and the world every time this helped it to preserve its CBRN and missile weapons and facilities, and has been willing to suffer repeated diplomatic embarrassments in the process. The biggest of these lies was its denial of a massive biological weapons program between 1991–1995, but it has lied about its missile, chemical and nuclear weapons programs as well. It has been repeatedly caught importing or attempting to import dual-use items and CIA and Department of Defense reporting makes it clear that it continues to do so to this date.

Digitized by Google

Original from
UNIVERSITY OF CALIFORNIA

THE CERTAINTY OF A CONTINUING THREAT

Given this background, several things become clear:

- Iraq is ruled by a regime of proven liars that will lie again whenever this is convenient.
- Iraq will never cease proliferating as long as the present regime is in power.
- Iraq does not perceive any moral or military "redlines" that will prevent it from using CBRN weapons if it feels this is expedient.
- Iraq will continue to try to develop long-range missiles but has long had other delivery options and will almost certainly continue to improve them.
- Iraqi proliferation will not be tied to one type of weapon of mass destruction. It will seek chemical, biological, radiological, and nuclear weapons.

These points in some ways make Iraq's current missile and CBRN capabilities moot. The issue is not whether Iraq has yet achieved nuclear weapons or extremely lethal biological weapons, or even whether it will indulge in another round of UN inspections. It is that this regime will eventually acquire nuclear weapons and biological weapons with equal or greater lethality if it is given the time and opportunity to do so. It also will not change character or somehow enter the mythical "family of nations." Its leadership has a grimly consistent record and set of goals, and the sons of Saddam Hussein have made it clear that Iraq has not even made a convincing public attempt to give up its claims to Kuwait or any of its other regional ambitions.

KEY UNCERTAINTIES

At the same time, it is important to make several caveats about Iraqi capabilities and intentions:

- Iraq has been more reckless than pragmatic in the past, and its leadership must fully understand the risks of using such weapons. However, Iraq's conventional weakness pushes it towards the threat or use of CBRN weapons, and Saddam Hussein took massive risks in invading Iran and Kuwait.
- No one outside the intelligence community and possibly within it can predict the point at which Iraq will get deliverable nuclear weapons or predict their yield and lethality.
- The same is true of highly lethal dry storable biological weapons, and of variants that are genetically engineered or have no effective medical treatment.
- Without an actual test or series of tests, neither we nor the Iraqi leadership can predict the lethality of a nuclear or biological weapon, of the reliability, accuracy, and efficacy of any given means of delivery. (The technical and historical data the U.S. has on weapons effects and lethality are not reliable enough to do more than speculate in these areas and errors of more than an order of magnitude are possible.)
- Iraq may or may not have the smallpox virus and the ability to conduct a major infectious attack using covert or asymmetric means. Such an attack could, however, have nuclear lethalities and might be undetectable until it was well underway.
- Iraq has the technical capability to use a combination of strike aircraft and/or residual missile forces to create a launch on warning or launch under attack capability.
- Iraq could probably covertly or directly mount a CBRN/missile attack on U.S. forces in Gulf ports, key facilities in Southern Gulf states, and/or Israel.
- Iraq does not have an extensive known history of using terrorist organizations or proxies, but does have associations with them, and there are no major barriers to such attacks. A covert and/or unattributable attack is possible, particularly under false flag conditions or ones where Iraq might be able to piggyback on an attack by a known terrorist group.
- Other nations, such as Iran, might in turn conduct false flag attacks designed to implicated Iraq.
- Iraq may have the capability to attack agriculture as well as humans.
- There is no way to determine how third countries would react to the threat or reality of an Iraqi CBRN attack until the event occurs. An Iraqi regime in extremis might attack nations like Kuwait, Israel, and Saudi Arabia either out of revenge or it an effort to broaden the conflict and preserve the regime.

Digitized by Google
Original from UNIVERSITY OF CALIFORNIA

The four most serious uncertainties, however, are not matters of what weapons Iraq has or how it might use them, but rather ones relating to the strategic options open to the U.S. First, they are whether U.S. containment can be successful in preventing Iraq from exploiting its CBRN capabilities. If the U.S. should lose its ability to enforce Operations Northern and Southern Watch and freedom of action in striking at those Iraqi capabilities it can identify, the answer is clearly no. The same may well be true if UN sanctions erode to the point where Iraq has much greater freedom of action in importing dual use items.

The second uncertainty is whether any new round of UN inspections can really be successful in stopping Iraqi proliferation. The answer is probably no. They might well be able to stop Iraq from major development of missiles and their deployment, large-scale production of chemical weapons, and producing fissile material in any significant amounts. They cannot affect Iraq's technology base, they cannot hope to detect a covert biological program with nuclear lethalities, and they cannot hope to prevent Iraq from assembling a nuclear device if it can obtain fissile or "dirty" fissile material from outside Iraq. In fact, efforts directed at large, observable Iraqi CBRN and missile activities may simply push Iraqi into concentrating on biological weapons and asymmetric means of delivery.

Third, it is uncertain that the U.S. can now do a more effective job of targeting Iraqi missile and CBRN facilities and weapons than it did during the Gulf War and Operation Desert Fox, in spite of the impressive advances in U.S. targeting and strike capabilities demonstrated in Kosovo and Afghanistan. Iraq is expert at camouflage, deception and the use of decoys, exploits dispersal and movement (shell games), creating duplicate and back-up systems, and creating small covert facilities. Preserving such residual capabilities would be particularly important in the case of biological and nuclear weapons.

Finally, the U.S. cannot count on Iraq ceasing to proliferate simply because of regime change—even if the new regime initially appears to do so. Iraq is a highly nationalistic country that exists in a region where Iran, Israel, Pakistan, India, Syria, and Egypt are also proliferators. As is the case with a number of Asian powers like South Korea and Taiwan, Iraq may at a minimum preserve a sudden breakout capability in an area like biological weapons almost regardless of regime.

Digitized by Google

Original from
UNIVERSITY OF CALIFORNIA

Table of Contents

TRENDS IN THE GULF MILITARY BALANCE - OVERVIEW 1

IRAQI VS. NEIGHBORING FORCES IN 2002 - PART ONE 3

GULF MILITARY FORCES IN 2002 - PART ONE 4

GULF MILITARY FORCES IN 2002 - PART ONE 5

GULF MILITARY FORCES IN 2002 - PART ONE 6
MAJOR MEASURES OF COMBAT EQUIPMENT STRENGTH - 2002 7

TOTAL GULF MILITARY MANPOWER BY SERVICE - 2002 8

TOTAL ACTIVE MILITARY MANPOWER IN GULF ARMIES IN 2002 9
TOTAL GULF OPERATIONAL ARMORED FIGHTING VEHICLES - 2002 10
TOTAL OPERATIONAL TANKS IN ALL GULF FORCES 1990-2002 11
MEDIUM TO HIGH QUALITY MAIN BATTLE TANKS BY TYPE IN 2002 12
ADVANCED ARMORED INFANTRY FIGHTING VEHICLES, RECONNAISSANCE VEHICLES, SCOUT VEHICLES AND LIGHT TANKS BY TYPE IN 2002 13
TOTAL GULF SELF-PROPELLED, TOWARD AND MULTIPLE LAUNCHER GULF ARTILLERY BY CATEGORY - 2002 14
GULF INVENTORY OF TOWED ARTILLERY BY CALIBER IN 2002 15
GULF INVENTORY OF SELF-PROPELLED ARTILLERY BY CALIBER IN 2002 16
GULF INVENTORY OF MULTIPLE ROCKET LAUNCHERS BY CALIBER IN 2002 17

TOTAL GULF AIR FORCE AND AIR DEFENSE MANPOWER – 2002 18
TOTAL OPERATIONAL COMBAT AIRCRAFT IN ALL GULF FORCES 1990-2002 19
GULF HIGH AND MEDIUM QUALITY FIXED WING FIGHTER, FIGHTER ATTACK, ATTACK, STRIKE, AND MULTI-ROLE COMBAT AIRCRAFT BY TYPE - 2002 20
GULF MEDIUM QUALITY FIXED WING FIGHTER, FIGHTER ATTACK, ATTACK, STRIKE, AND MULTI-ROLE COMBAT AIRCRAFT BY TYPE - 2001 21
GULF LOW QUALITY FIXED WING FIGHTER, FIGHTER ATTACK, ATTACK, STRIKE, AND MULTI-ROLE COMBAT AIRCRAFT BY TYPE - 2002 22
GULF RECONNAISSANCE AIRCRAFT IN 2002 23
SENSOR, AWACS, C4I, EW AND ELINT AIRCRAFT IN 2002 24
GULF ATTACK HELICOPTERS IN 2002 25
GULF LAND-BASED AIR DEFENSE SYSTEMS IN 2002 26

TOTAL GULF NAVAL MANPOWER IN 2002 27
GULF NAVAL SHIPS BY CATEGORY IN 2002 28
GULF WARSHIPS WITH ANTI-SHIP MISSILES IN 2002 29
GULF MINE WARFARE SHIPS IN 2002 30
GULF AMPHIBIOUS WARFARE SHIPS IN 2002 31
GULF NAVAL AIRCRAFT AND HELICOPTERS AIRCRAFT IN 2002 32

GULF ARMS BUYS BY SUPPLIER: 1987-2000 33
TOTAL GULF NEW ARMS AGREEMENTS FROM THE GULF WAR TO 2000 34
TOTAL GULF NEW ARMS DELIVERIES FROM THE GULF WAR TO 2000 35
TOTAL GULF NEW ARMS AGREEMENTS AND DELIVERIES 1997-2000 36

IRAQ - OVERVIEW 37
IRAQI DEPENDENCE ON DECAYING, OBSOLETE, OR OBSOLESCENT MAJOR WEAPONS 38
Land Forces *38*
IRAQ'S MASSIVE MILITARY EFFORT BEFORE THE GULF WAR 39

Copyright Anthony H. Cordesman, all rights reserved.

Digitized by Google

Original from
UNIVERSITY OF CALIFORNIA

THE IRAQI CUMULATIVE ARMS IMPORT DEFICIT ENFORCED BY UN SANCTIONS 40
THE PROBLEM OF IRAQI MILITARY PRODUCTION 41
MAJOR IRAQI MILITARY PRODUCTION FACILITIES 42

Copyright Anthony H. Cordesman, all rights reserved.

Digitized by Google

Original from
UNIVERSITY OF CALIFORNIA

Trends in the Gulf Military Balance - Overview

- Despite the Gulf War, and the loss of some 40% of its army and air force order of battle, Iraq remains the most effective military power in the Gulf.
    - It still has an army of around 375,000 men, and an inventory of some 2,200 main battle tanks, 3,700 other armored vehicles, and 2,400 major artillery weapons. It also has over 300 combat aircraft with potential operational status.
    - At the same time, Iraq has lacked the funds, spare parts, and production capabilities to sustain the quality of its consolidated forces.
    - Iraq has not been able to restructure its overall force structure to compensate as effectively as possible for its prior dependence on an average of $3 billion a year in arms deliveries. It has not been able to recapitalize any aspect of its force structure, and about two-thirds of its remaining inventory of armor and aircraft is obsolescent by Western standards.
    - Iraq has not been able to fund and/or import any major new conventional warfare technology to react to the lessons of the Gulf War, or to produce any major equipment -- with the possible exception of limited numbers of Magic "dogfight" air-to-air missiles.
    - In contrast, Saudi Arabia has taken delivery on over $66 billion worth of new arms since 1991, Kuwait has received $7.6 billion, Iran $4.3 billion, Bahrain $700 million, Oman $1.4 billion, Qatar $1.7 billion, and the UAE $7.9 billion.
    - Equally important, the US has made major upgrades in virtually every aspect of its fighter avionics, attack munitions, cruise missile capabilities, and intelligence, reconnaissance, and targeting capabilities.
    - Iraq's inability to recapitalize and modernize its forces means that much of its large order of battle is now obsolescent or obsolete, has uncertain combat readiness, and will be difficult to sustain in combat. It also raises serious questions about the ability of its forces to conduct long-range movements or maneuvers and then sustain coherent operations.
    - Iraq has demonstrated that it can still carry out significant ground force exercises and fly relatively high sortie rates. It has not, however, demonstrated training patterns that show its army has consistent levels of training, can make effective use of combined arms above the level of some individual brigades, or has much capability for joint land-air operations. It has not demonstrated that it can use surface-to-air missiles in a well-organized way as a maneuvering force to cover its deployed land forces.
- Iran remains a major threat to Iraq. Iran lost 40-60% of its major land force equipment during the climactic battles of the Iran-Iraq War in 1988. It has, however, largely recovered from its defeat by Iraq and now has comparatively large forces.
    - Iran now has an army of around 450,000 men – including roughly 125,000 Revolutionary Guards, and an inventory of some 1,600 main battle tanks, 1,500 other armored vehicles, and 3,200 major artillery weapons. It also has over 280 combat aircraft with potential operational status.
    - Iran has been able to make major improvements in its ability to threaten maritime traffic through the Gulf, and to conduct unconventional warfare.
    - Iran has also begun to acquire modern Soviet combat aircraft and has significant numbers of the export version of the T-72 and BMP.

Copyright Anthony H. Cordesman, all rights reserved.

Digitized by Google

Original from
UNIVERSITY OF CALIFORNIA

- Iran has not, however, been able to offset the obsolescence and wear of its overall inventory of armor, ships, and aircraft.

- Iran has not been able to modernize key aspects of its military capabilities such as airborne sensors and C³I/BM, electronic warfare, land-based air defense integration, beyond-visual-range air-to-air combat, night warfare capabilities, stand-off attack capability, armored sensors and fire control systems, artillery mobility and battle management, combat ship systems integration, etc.

- In contrast, no Southern Gulf state has built up significant ground forces since the Gulf War, and only Saudi Arabia has built up a significant air force.

  - Only two Southern Gulf forces – those of Saudi Arabia and Kuwait – have a significant defense capability against Iraq.

  - Iran now has an army of around 11,000 men, and an inventory of some 300 main battle tanks, 500 other armored vehicles, and 100 major artillery weapons. It also has some 80 combat aircraft. It can only effectively man and deploy about two-thirds of its land weapons and

  - Saudi Arabia has made real progress in improving its 75,000 man National Guard. Its army, however, lacks effective leadership, training, and organization. It now has an army of around 75,000 men –, and an inventory of some 1,055 main battle tanks, 4,800 other armored vehicles, and 500 major artillery weapons. It also has around 350 combat aircraft with potential operational status. The army has made little overall progress in training since the Gulf War, can probably only fight about half of its equipment holdings in the Iraqi border area (and it would take 4-6 weeks to deploy and prepare this strength), and has declined in combined arms capability since the Gulf War. It has little capability for joint land-air operations. Its individual pilots and aircraft have experienced a growing readiness crisis since the mid-1990s. It has lacked cohesive leadership as a fighting force since that time and cannot fight as a coherent force without US support and battle management..

  - Kuwait now has an army of only around 11,000 men, and an active inventory of some 293 main battle tanks, 466 other armored vehicles, and 17 major artillery weapons. It has only 82 combat aircraft with potential operational status. It is making progress in training, but has not shown it can make effective use of combined arms above the battalion level, and has little capability for joint land-air operations. Its individual pilots and aircraft have moderate readiness, but cannot fight as a coherent force without US support and battle management.

  - There has been little progress in standardization and interoperability; advances in some areas like ammunition have been offset by the failure to integrate increasingly advanced weapons systems.

  - Showpiece exercises and purchases disguise an essentially static approach to force improvement which is heavily weapons oriented, and usually shows little real-world appreciation of the lessons of the Gulf War, the "revolution in military affairs," and the need for sustainability.

  - Current arms deliveries are making only token progress in correcting the qualitative defects in Southern Gulf forces, and no meaningful progress in being made towards integrating the Southern Gulf countries under the Gulf Cooperation Council (GCC).

Copyright Anthony H. Cordesman, all rights reserved.

Digitized by Google

Original from
UNIVERSITY OF CALIFORNIA

Iraqi vs. Neighboring Forces in 2002 - Part One

	Iran	Iraq	Bahrain	Kuwait	Saudi Arabia*		Turkey	Jordan	Syria
Manpower									
Total Active	513,000	424,000	11,000	15,300	201,500	515,100	100,240	321,000	
Regular	325,000	375,000	11,000	15,300	105,500	515,100	100,240	321,000	
National Guard & Other	125,000	0	0	0	75,000	0	0	0	
Reserve	350,000	650,000	0	23,700	20,000	378,700	35,000	354,000	
Paramilitary	40,000	42,000+	10,160	5,000	15,500+	152,200	10,000	108,000	
Army and Guard									
Manpower	450,000*	375,000	8,500	11,000	150,000	402,000	84,700	215,000	
Regular Army Manpower	325,000	375,000	8,500	11,000	75,000	402,000	84,700	215,000	
Reserve	350,000	650,000	0	0	20,000	258,700	30,000	280,000	
Total Main Battle Tanks***	1,565	2,200	106	385	1,055	4,205	1,058	3,500 (1,200)	
Active Main Battle Tanks	1,565	1,900	106	293	710	2,995	1,030	3,200	
Active AIFV/Recce, Lt. Tanks	865	1,300	71	355	1,270+	3,600	85	3,285	
Total APCs	590	2,400	235	131	3,440	3,643	1,130	1,600	
Active APCs	550	1,800	205	111	2,630	3,480	980	1,200	
ATGM Launchers	75	100+	15	118	480+	943	640	6,050	
Self Propelled Artillery	310	150	62	68 (18)	200	668	418	450	
Towed Artillery	2,085	1,900	22	0	238(58)	679	113	1,630	
MRLs	889+	200	9	27	60	84	0	480	
Mortars	5,000	2,000+	21	78	400	2,021	700	658	
SSM Launchers	51	56	0	0	10	0	0	72	
Light SAM Launchers	?	1,100	78	0	650	897	944	4,055	
AA Guns	1,700	6,000	27	0	10	1,664	416	2,060	
Air Force Manpower	30,000	30,000	1,500	2,500	20,000	60,100	15,000	40,000	
Air Defense Manpower	15,000	17,000	0	0	16,000	0	0	60,000	
Total Combat Aircraft	283	316	34	82	348	505	101	589	
Bombers	0	6	0	0	0	0	0	0	
Fighter/Attack	163+	130	12	40	100	-	70	154	
Fighter/Interceptor	74+	180	22	14	181	-	31	310	
Recce/FGA Recce	6	5	0	0	10	59	0	14	
AEW C4I/BM	1	0	0	0	5	7	0	0	
MR/MPA**	5	0	0	0	0	-	0	0	
OCU/COIN/CCT	0	0	0	28	14	-	0	0	
Other Combat Trainers	35	157	0	0	50	-	0	111	
Transport Aircraft****	68	12	3	4	61	80		25	
Tanker Aircraft	4	2	0	0	16	7	0	0	
Total Helicopters	628	375	47	28	137	-	73	197	
Armed Helicopters****	104	100	40	16	21	37	20	87	
Other Helicopters****	524	275	7	12	116	-	53	110	
Major SAM Launchers	250+	400	15	84	106	92	80	648	
Light SAM Launchers	?	1,100	-	60	309	86	-	60	
AA Guns	-	6,000	-	60	340	-	-	4,000	

Copyright Anthony H. Cordesman, all rights reserved.

Digitized by Google

Original from
UNIVERSITY OF CALIFORNIA

Iraqi vs. Neighboring Forces in 2002 - Part One

	Iran	Iraq	Bahrain	Kuwait	Saudi Arabia*	Turkey	Jordan	Syria
Total Naval Manpower	38,000*	2,000	:,000	2,000	15,500	53,000	540	6,000
Regular Navy	15,400	2,000	:,000	2,000	12,500	49,900	540	6,000
Naval Guards	20,000	0	0	0	0	0	0	0
Marines	2,600	-	-	-	3,000	3,100	0	0
Major Surface Combatants								
Missile	3	0	3	0	8	22	0	0
Other	0	0	0	0	0	1	0	2
Patrol Craft								
Missile	10	1	6	10	9	21	0	10
(Revolutionary Guards)	10	-	-	-	-	-	-	-
Other	42	5	4	0	17	28	3	8
Revolutionary Guarcs (Boats)	40	-	-	-	-	-	-	-
Submarines	3	0	0	0	0	13	0	0
Mine Vessels	7	3	0	0	7	24	0	5
Amphibious Ships	9	0	0	0	0	8	0	3
Landing Craft	9	-	4	2	8	59	0	4
Support Ships	22	2	5	4	7	27	0	4
Naval Air	2,000	-	-	-	-	-	0	0
Naval Aircraft								
Fixed Wing Combat	5	0	0	0	0	0	0	0
MR/MPA	10	0	0	0	0	0	0	0
Armed Helicopters	19	0	0	0	21	16	0	:6
SAR Helicopters	-	0	0	0	4	0	0	0
Mine Warfare Helicopters	3	0	0	0	0	0	0	0
Other Helicopters	19	-	2	-	6	7	0	-

Note: Equipment in storage shown is the higher figure in parenthesis or in range. Air Force totals include all helicopters, including army operated weapons, and all heavy surface-to-air missile launchers.

* Iranian total includes roughly 100,000 Revolutionary Guard actives in land forces and 20,000 in naval forces.

** Saudi Totals for reserve include National Guard Tribal Levies. The total for land forces includes active National Guard equipment. These additions total 450 AIFVs, 730(1,540) APCs, and 70 towed artillery weapons.

*** Total tanks include tanks in storage or conversion.

**** Includes navy, army, national guard, and royal flights, but not paramilitary.

***** Includes in Air Defense Command

Source: Adapted by Anthony H. Cordesman from interviews, International Institute for Strategic Studies, Military Balance (IISS, London); Jane's Sentinel, Periscope; and Jaffee Center for Strategic Studies. The Military Balance in the Middle East (JCSS, Tel Aviv)

Copyright Anthony H. Cordesman, all rights reserved.

Digitized by Google

Original from
UNIVERSITY OF CALIFORNIA

Gulf Military Forces in 2002 - Part One

	Iran	Iraq	Bahrain	Kuwait	Oman	Qatar	Saudi Arabia*	UAE	Yemen
Manpower									
Total Active	513,000	424,000	11,000	15,500	43,400	12,330	201,300	65,000	54,000
Regular	325,000	375,000	11,000	15,500	28,900	12,330	105,500	65,000	54,000
National Guard & Other	125,000	0	0	0	6,400	0	75,000	0	0
Reserve	350,000	650,000	0	23,700	0	0	20,000	0	40,000
Paramilitary	40,000	42,000+	10,160	5,000	4,400	0	15,500+	1,100	70,000
Army and Guard									
Manpower	450,000*	375,000	8,500	11,000	25,000	8,500	150,000	59,000	49,000
Regular Army Manpower	325,000	375,000	8,500	11,000	25,000	8,500	75,000	59,000	49,000
Reserve	350,000	650,000	0	0	0	0	20,000	0	40,000
Total Main Battle Tanks***	1,565	2,200	106	385	117	35	1,055	411	910
Active Main Battle Tanks	1,565	1,900	106	293	117	35	710	330	910
Active AIFV/Recce, Lt. Tanks	865	1,300	71	355	78	112	1,270+	780(40)	440
Total APCs	590	2,400	235	151	189	190	3,440	620	440
Active APCs	550	1,800	203	111	103	172	2,630	570	240
ATGM Launchers	75	100+	15	118	48	124+	480+	305	71
Self Propelled Artillery	310	150	62	68 (18)	24	28	200	181	55
Towed Artillery	2,085	1,900	22	0	96	12	238(58)	80	395
MRLs	889+	200	9	27	0	4	60	72(24)	165
Mortars	5,000	2,000+	21	78	101	45	400	155	502
SSM Launchers	51	56	0	0	0	0	10	6	30
Light SAM Launchers	?	1,100	78	0	72	0	650	100	800
AA Guns	1,700	6,000	27	0	26	0	10	62	530
Air Force Manpower	30,000	30,000	1,500	2,500	4,100	2,100	20,000	4,000	3,500
Air Defense Manpower	15,000	17,000	0	0	0	0	16,000	0	0
Total Combat Aircraft	283	316	34	82	40	18	348	101	71(40)
Bombers	0	6	0	0	0	0	0	0	0
Fighter/Attack	163+	130	12	40	12	18	100	43	40
Fighter/Interceptor	74+	180	22	14	0	0	181	22	25
Recce/FGA Recce	6	5	0	0	12	0	10	8	0
AEW C4I/BM	1	0	0	0	0	0	5	0	
MR/MPA**	5	0	0	0	0	0	0	0	0
OCU/COIN/CCT	0	0	0	28	16	0	14	28	0
Other Combat Trainers	35	157	0	0	0	0	50	0	6
Transport Aircraft****	68	12	3	4	16	6	61	21	18
Tanker Aircraft	4	2	0	0	0	0	16	0	0
Total Helicopters	628	375	47	28	30	23	137	105	25
Armed Helicopters*****	104	100	40	16	0	19	21	49	8
Other Helicopters*****	524	275	7	12	30	4	116	56	17
Major SAM Launchers	250+	400	15	84	40	9	106	39	57
Light SAM Launchers	?	1,100	-	60	28	90	309	134	120
AA Guns	-	6,000	-	60	-	-	340	-	-

Copyright Anthony H. Cordesman, all rights reserved.

Digitized by Google

Original from
UNIVERSITY OF CALIFORNIA

Gulf Military Forces in 2002 - Part One

	Iran	Iraq	Bahrain	Kuwait	Oman	Qatar	Saudi	UAE Arabia**	Yemen
Total Naval Manpower	38,000*	2,000	1,000	2,000	4,200	1,730	15,500	2,000	1,500
Regular Navy	15,400	2,000	1,000	2,000	4,200	1,730	12,500	2,000	1,500
Naval Guards	20,000	0	0	0	0	0	0	0	0
Marines	2,600	-	-	-	-	-	3,000	-	-
Major Surface Combatants									
Missile	3	0	3	0	0	0	8	4	0
Other	0	0	0	0	0	0	0	0	0
Patrol Craft									
Missile	10	1	6	10	6	7	9	8	4
(Revolutionary Guards)	10	-	-	-	-	-	-	-	-
Other	42	5	4	0	7	-	17	6	5
Revolutionary Guards (Boats)	40	-	-	-	-	-	-	-	-
Submarines	3	0	0	0	0	0	0	0	0
Mine Vessels	7	3	0	0	0	0	7	0	6
Amphibious Ships	9	0	0	0	1	0	0	0	1
Landing Craft	9	-	4	2	4	0	8	5	5
Support Ships	22	2	5	4	4	-	7	2	2
Naval Air	2,000	-	-	-	-	-	-	-	-
Naval Aircraft									
Fixed Wing Combat	5	0	0	0	0	0	0	0	0
MR/MPA	10	0	0	0	(7)	0	0	0	0
Armed Helicopters	19	0	0	0	0	0	21	(8)	0
SAR Helicopters	-	0	0	0	0	0	4	(6)	0
Mine Warfare Helicopters	3	0	0	0	0	0	0	0	0
Other Helicopters	19	-	2	-	-	-	6	-	

Note: Equipment in storage shown in the higher figure in parenthesis or in range. Air Force totals include all helicopters, including army operated weapons, and all heavy surface-to-air missile launchers.

* Iranian total includes roughly 100,000 Revolutionary Guard actives in land forces and 20,000 in naval forces.

** Saudi Totals for reserve include National Guard Tribal Levies. The total for land forces includes active National Guard equipment. These additions total 450 AIFVs, 730(1,340) APCs, and 70 towed artillery weapons.

*** Total tanks include tanks in storage or conversion.

**** Includes navy, army, national guard, and royal flights, but not paramilitary.

***** Includes in Air Defense Command

Source: Adapted by Anthony H. Cordesman from interviews, International Institute for Strategic Studies, Military Balance (IISS, London); Jane's Sentinel, Periscope; and Jaffee Center for Strategic Studies, The Military Balance in the Middle East (JCSS, Tel Aviv)

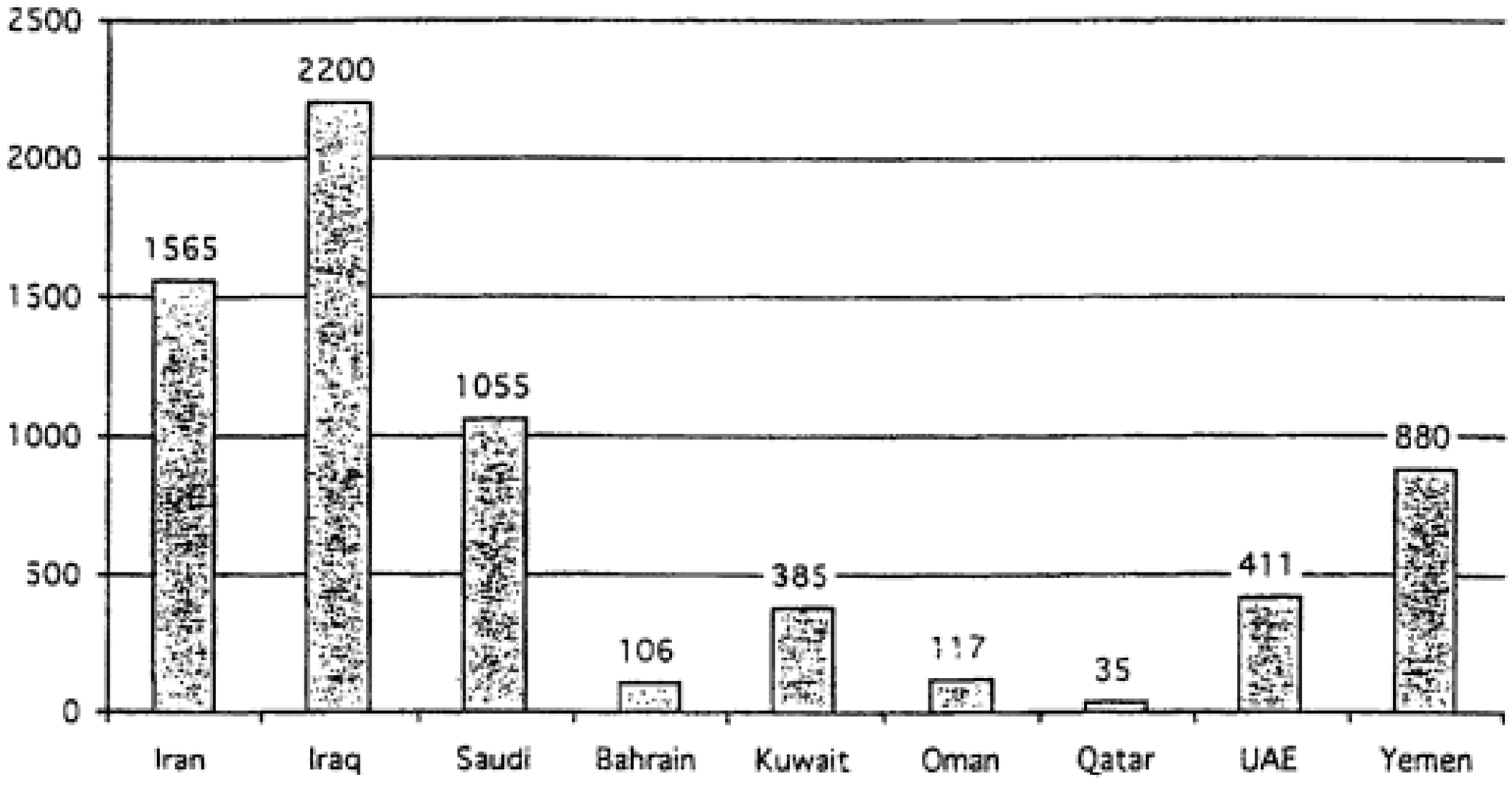
Copyright Anthony H. Cordesman, all rights reserved.

Digitized by Google

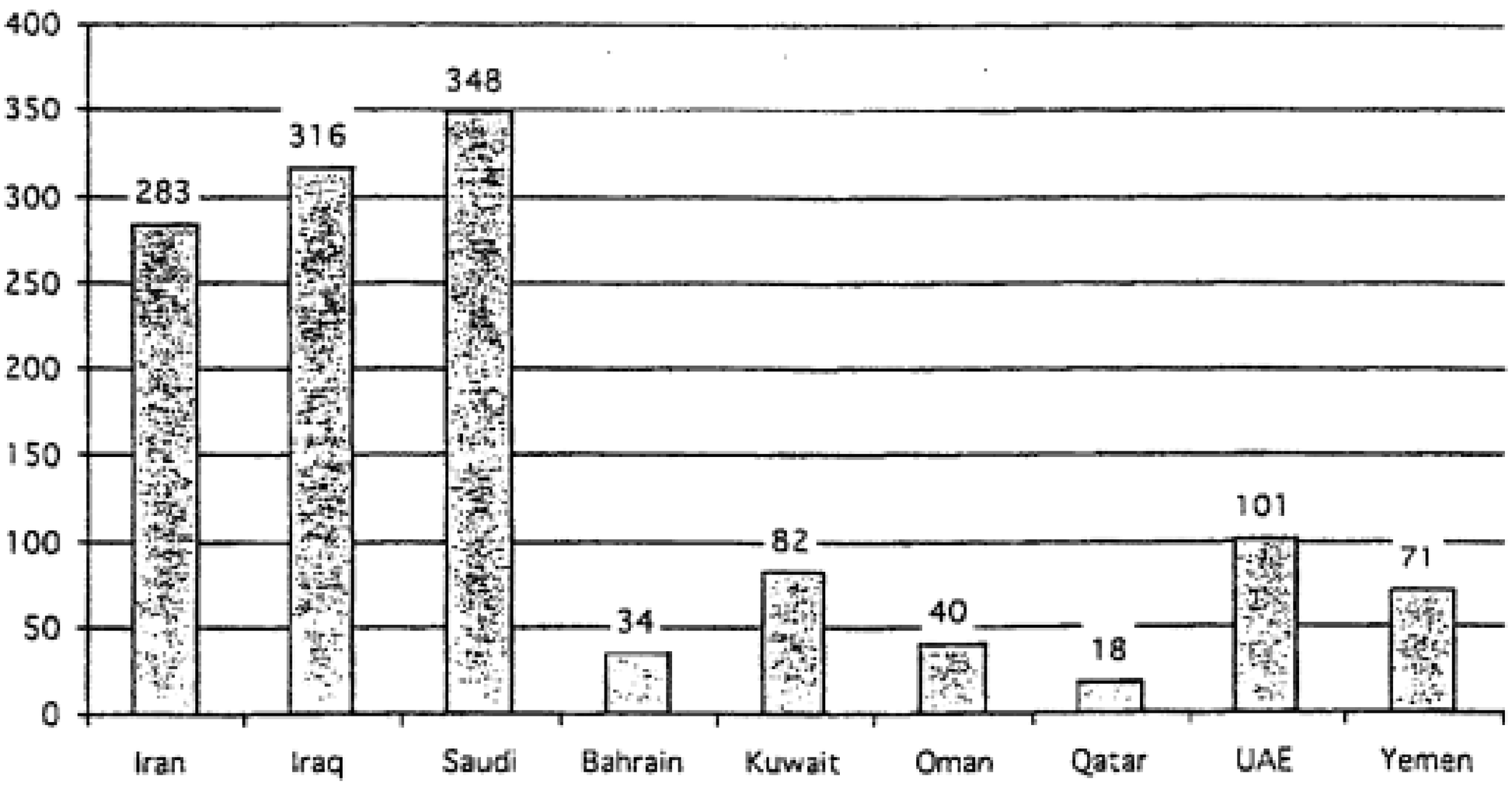
Original from
UNIVERSITY OF CALIFORNIA

Major Measures of Combat Equipment Strength - 2002

Total Main Battle Tanks in Inventory



Total Fixed Wing Combat Aircraft



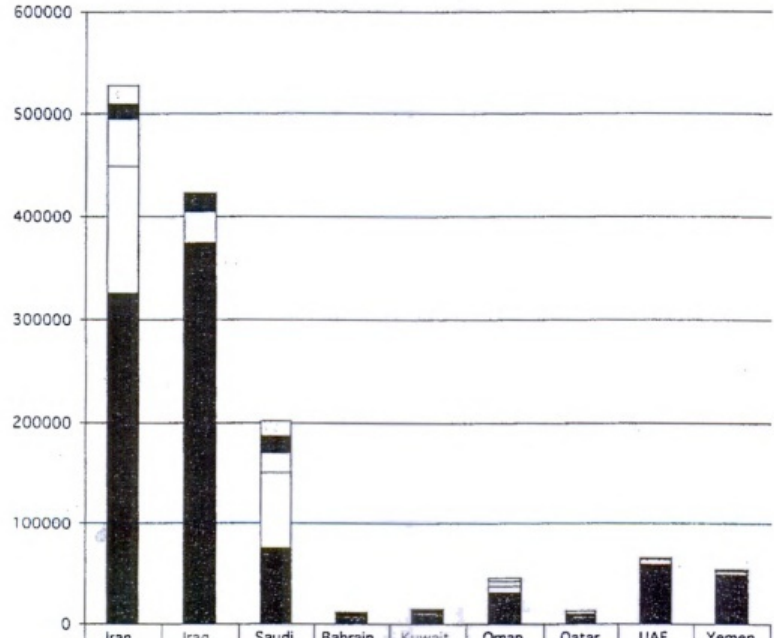
Source: Estimated by Anthony H. Cordesman using data from the IISS Military Balance, the on-line edition of Jane's Sentinel Security Assessment, and the on-line edition of Periscope.

Copyright Anthony H Cordesman, all rights reserved.

Digitized by Google

Original from
UNIVERSITY OF CALIFORNIA

Total Gulf Military Manpower By Service - 2002



	Iran	Iraq	Saudi	Bahrain	Kuwait	Oman	Qatar	UAE	Yemen
□ Navy	18000	2000	15500	1000	2000	4200	1730	2000	1500
■ Air Def	15000	17000	16000	-	-	-	-		
□ Air	45000	30000	20000	1500	2500	4100	2100	4000	3500
□ Guard	125000	-	75000	-	-	6400	-		
■ Army	325000	375000	75000	8500	11000	31500	8500	59000	49000

Source: Estimated by Anthony H. Cordesman using data from the IISS Military Balance, the on-line edition of Jane's Sentinel Security Assessment, and the on-line edition of Periscope.

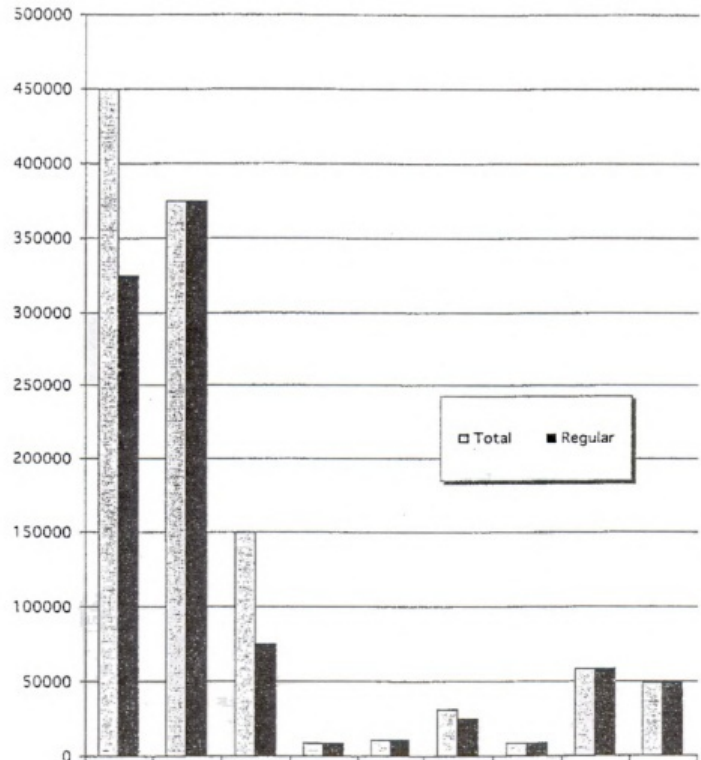
Copyright Anthony H. Cordesman, all rights reserved.

Digitized by Google

Original from
UNIVERSITY OF CALIFORNIA

Total Active Military Manpower in Gulf Armies in 2002

(Total includes Iranian Revolutionary Guard, Saudi National Guard, and Omani Royal Guard)



	Iran	Iraq	Saudi Arabia	Bahrain	Kuwait	Oman	Qatar	UAE	Yemen
Total	450000	375000	150000	8500	11000	31500	8500	59000	49000
Regular	325000	375000	75000	8500	11000	25000	8500	59000	49000

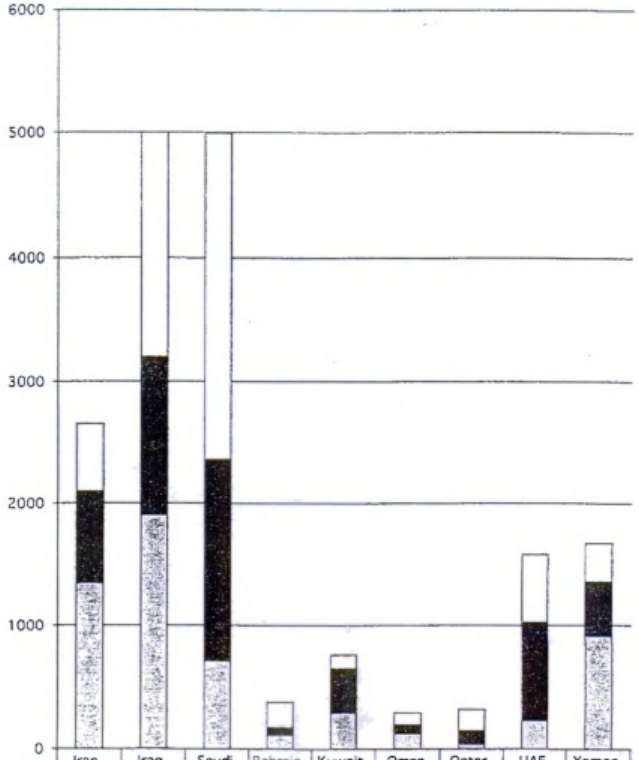
Source: Estimated by Anthony H. Cordesman using data from various editions of the IISS Military Balance, Jane's Sentinel, and Military Technology.

Copyright Anthony H. Cordesman, all rights reserved.

Digitized by Google

Original from UNIVERSITY OF CALIFORNIA

Total Gulf Operational Armored Fighting Vehicles - 2002



	Iran	Iraq	Saudi	Bahrain	Kuwait	Oman	Qatar	UAE	Yemen
□ APCs	550	1800	2630	205	111	103	172	570	340
■ AIFV/Recce/Lt. Tanks	755	1300	1655	71	355	78	112	780	440
□ Main Battle Tanks	1345	1900	710	106	293	117	35	237	910

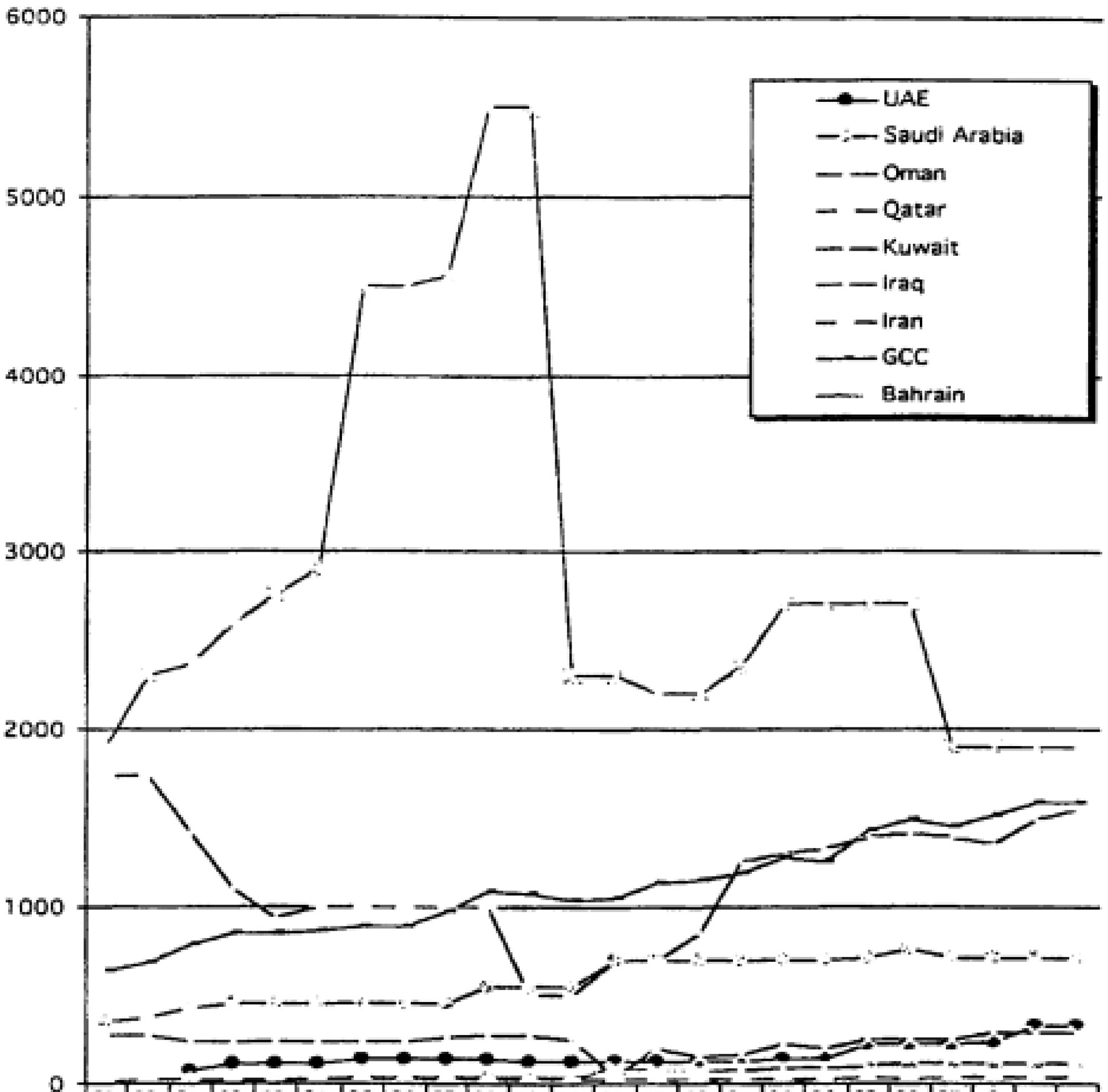
Source: Estimated by Anthony H. Cordesman using data from the IISS Military Balance, the on-line edition of Jane's Sentinel Security Assessment, and the on-line edition of Periscope.

Copyright Anthony H. Cordesman, all rights reserved.

Digitized by Google

Original from UNIVERSITY OF CALIFORNIA

Total Operational Tanks in All Gulf Forces 1990-2002



	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	0	1	2
UAE			75	118	118	118	136	136	136	136	131	131	131	131	125	125	133	133	231	231	231	237	330	330
Saudi Arabia	350	380	430	450	450	450	450	450	450	550	550	550	700	700	696	700	700	700	710	760	710	710	710	710
Oman			18	18	18	26	33	39	39	39	39	39	82	78	73	73	91	91	97	117	117	117	117	117
Qatar	12	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	34	24	34	35	35	35
Kuwait	280	280	240	240	240	240	240	240	260	275	275	245	36	200	150	164	220	198	247	249	249	293	293	293
Iraq	190	230	236	260	275	290	450	450	456	550	550	230	230	220	220	235	270	270	270	270	190	190	190	190
Iran	173	173	141	110	940	100	100	100	100	100	500	500	700	700	850	124	130	132	139	141	139	134	149	154
GCC	642	684	787	850	850	858	883	889	969	108	107	104	105	113	114	119	127	125	142	148	144	150	159	159
Bahrain									60	60	54	54	81	81	81	106	106	106	106	106	106	106	106	106

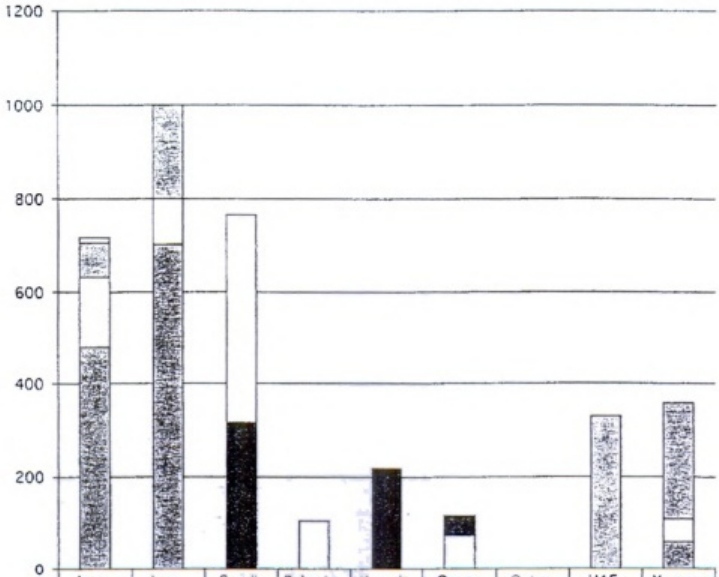
Note: Iran includes active forces in the Revolutionary Guards. Saudi Arabia includes active National Guard.
Adapted by Anthony H. Cordesman from various sources and the IISS Military Balance, the on-line edition of Jane's Sentinel Security Assessment, and the on-line edition of Periscope.

Copyright Anthony H. Cordesman, all rights reserved.

Digitized by Google

Original from
UNIVERSITY OF CALIFORNIA

Medium to High Quality Main Battle Tanks By Type in 2002



	Iran	Iraq	Saudi	Bahrain	Kuwait	Oman	Qatar	UAE	Yemen
□ Zulfiqar	10								
□ T-62	75	200							250
□ M-60A1	150	100				6			50
■ OF-40									
■ T-72	480	700							60
□ M-84									
□ Le Clerc								330	
■ Challenger 2						38			
□ M-60A2									
□ M-60A3			450	106		73			
■ M-1A2			315		218				

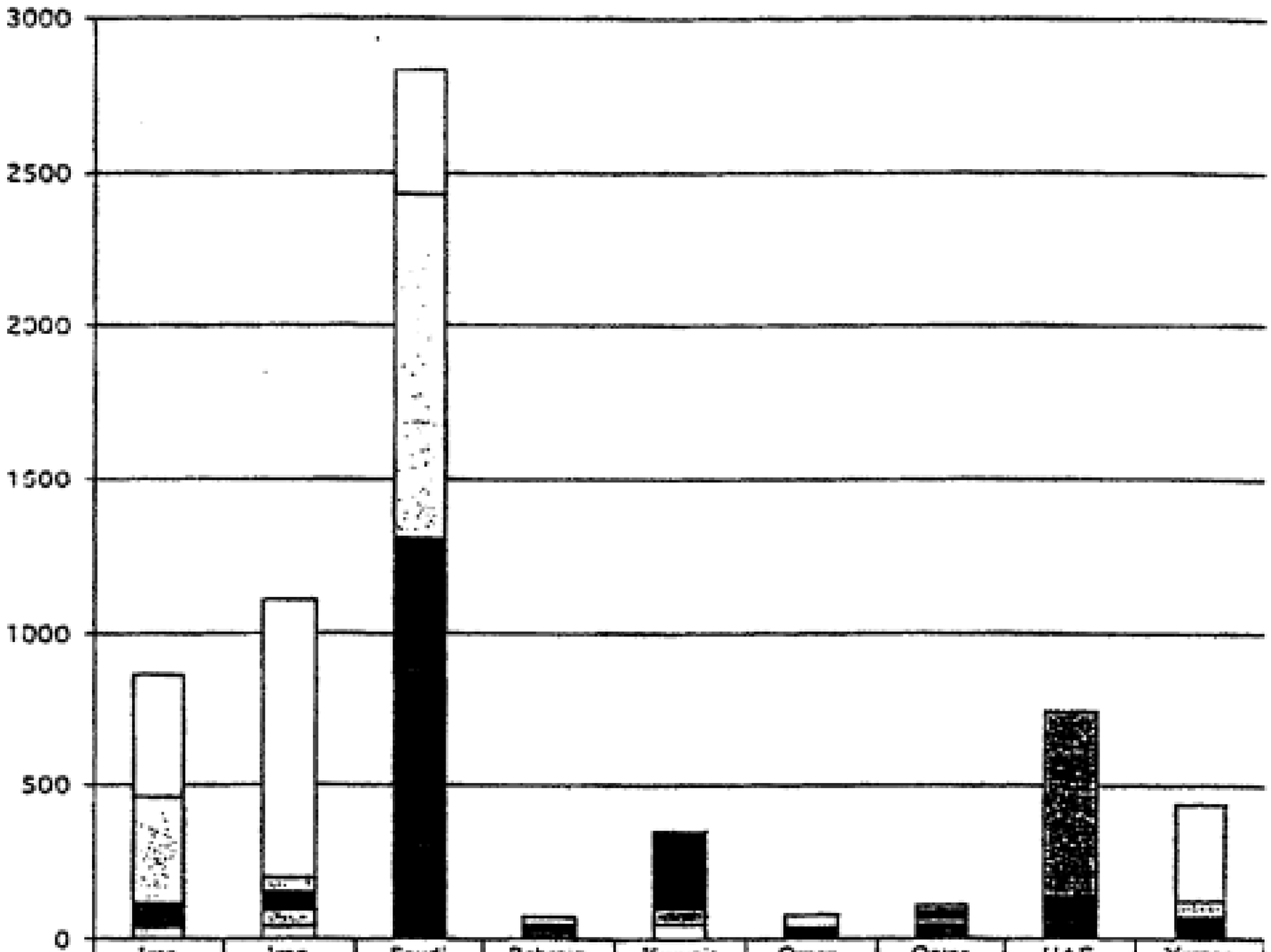
Note: Iran includes active forces in the Revolutionary Guards. Saudi Arabia includes active National Guard. Source: Adapted by Anthony H. Cordesman from the IISS, Military Balance, Periscope, JCSS, Middle East Military Balance, Jane's Sentinel, and Jane's Defense Weekly.

Copyright Anthony H. Cordesman, all rights reserved.

Digitized by Google

Original from UNIVERSITY OF CALIFORNIA

Advanced Armored Infantry Fighting Vehicles, Reconnaissance Vehicles, Scout Vehicles and Light Tanks by Type in 2002



	Iran	Iraq	Saudi	Bahrain	Kuwait	Oman	Qatar	UAE	Yemen
◘ VBL	-	-	-	-	-	41	16	-	-
◘ Bradley	-	-	400	-	-	-	-	-	-
■ Warrior	-	-	-	-	254	-	-	-	-
◘ BMP-3	-	-	-	-	35	-	-	600	-
◘ BMP-2	400	-	-	-	46	-	-	-	-
◘ BMP-1	350	-	-	-	-	-	-	-	-
◘ BMP-1/2	-	900	-	-	-	-	-	-	320
■ Scorpion	80	-	-	-	-	37	-	76	-
◘ LAV Variants	-	-	1117	-	-	-	-	-	-
■ Piranha I/II	-	-	440	-	-	-	36	-	-
◘ YPR-765	-	-		25	-	-	-	-	-
◘ AMX-10RC	-	-	-	-	-	-	12	-	-
■ AMX-10P	-	-	570	-	-	-	40	15	-
◘ BDRM-2	-	50	-	-	-	-	-	-	50
◘ AML-245	-	-	-	-	-	-	-	-	
■ AML-60/90	-	60	300	22	-	-	-	49	70
◘ EE-9 Cascavel	35	54	-	-	-	-	-	-	-
◘ EE-3 Jarara	-	40	-	-	-	-	-	-	-
◘ V-150	-	-		-	-	-	8		-
■ Armored Cars	-	-	-	24	-	-	-	*(40)	-

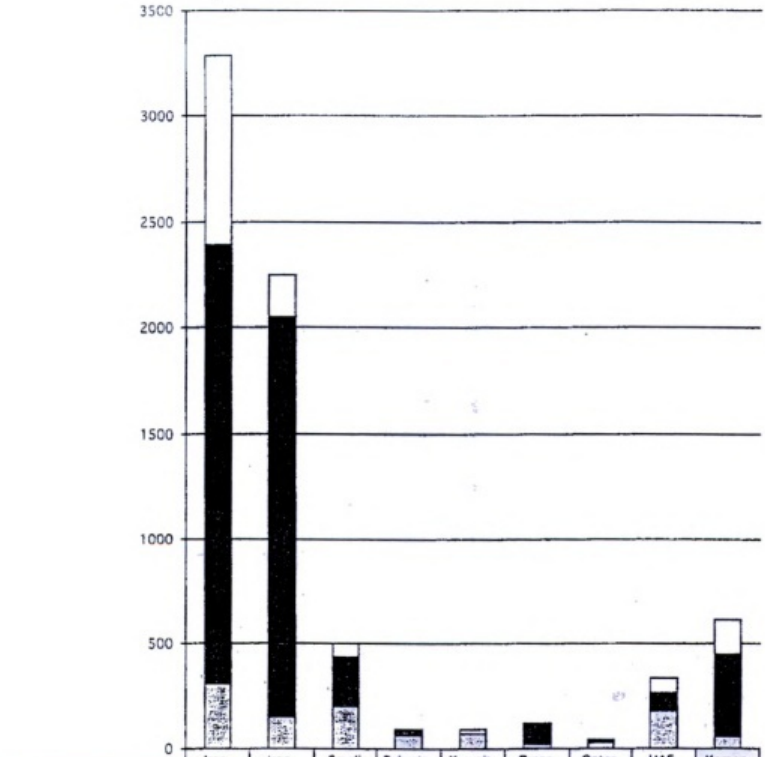
Source: Estimated by Anthony H. Cordesman using data from the IISS Military Balance, the on-line edition of Jane's Sentinel Security Assessment, and the on-line edition of Periscope.

Copyright Anthony H Cordesman, all rights reserved.

Digitized by Google

Original from
UNIVERSITY OF CALIFORNIA

Total Gulf Self-Propelled, Toward and Multiple Launcher Gulf Artillery By Category - 2002



	Iran	Iraq	Saudi	Bahrain	Kuwait	Oman	Qatar	UAE	Yemen
Multiple Rocket Launcher	889	200	60	9	27	0	4	72	165
Towed Tube	2085	1900	238	22	0	96	12	80	395
Self-Propelled Tube	310	150	200	62	68	24	28	181	55

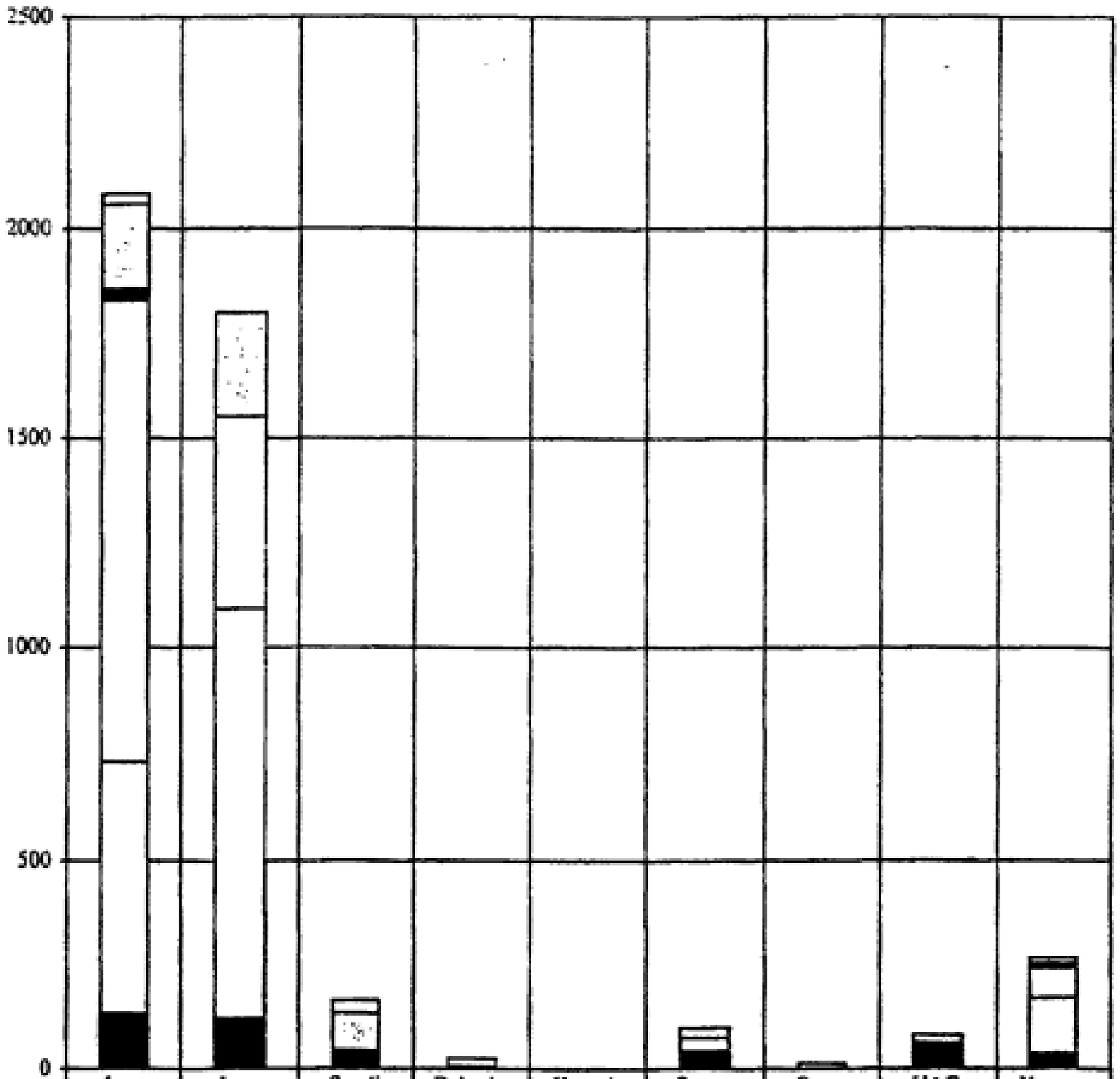
Source: Adapted by Anthony H. Cordesman from the IISS, Military Balance, Periscope, JCSS, Middle East Military Balance, Jane's Sentinel, Jane's Defense Weekly, and material provided by US experts.

Copyright Anthony H. Cordesman, all rights reserved

Digitized by Google

Original from UNIVERSITY OF CALIFORNIA

Gulf Inventory of Towed Artillery by Caliber in 2002



	Iran	Iraq	Saudi	Bahrain	Kuwait	Oman	Qatar	UAE	Yemen
◻ 203 mm	20		30						
■ 180 mm									
◻ 175 mm									
◻ 155 mm	205	250	90	14			12		15
■ 152 mm	30								10
◻ 130 mm	1100	460				24			75
◻ 122 mm	600	970				30		20	130
■ 105 mm	130	120	40	8		42		60	35
◻ 100 mm									

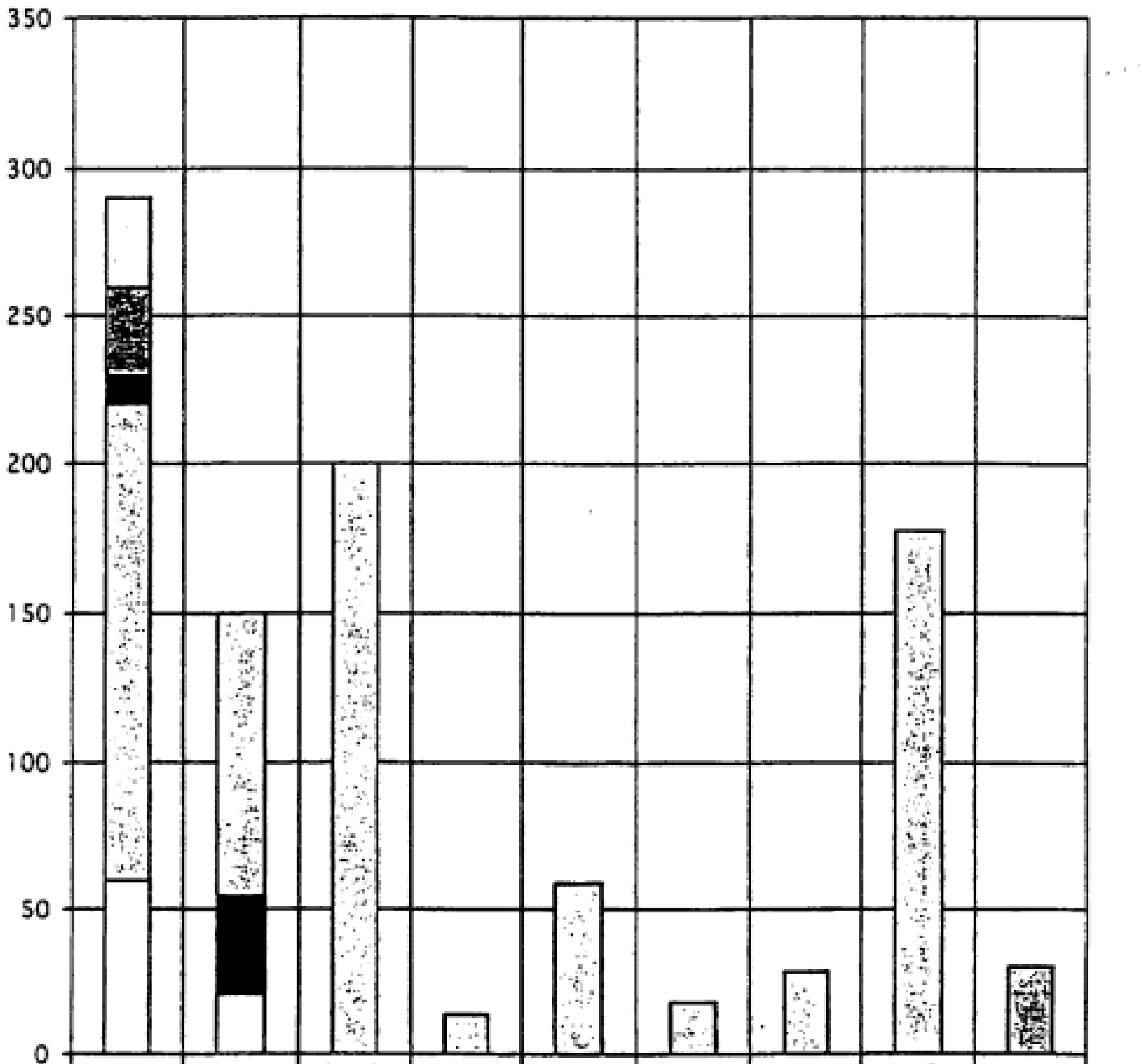
Source: Prepared by Anthony H. Cordesman, based upon discussions with US experts using data from the IISS Military Balance, the on-line edition of Jane's Sentinel Security Assessment, and the on-line edition of Periscope.

Copyright Anthony H. Cordesman, all rights reserved.

Digitized by Google

Original from
UNIVERSITY OF CALIFORNIA

Gulf Inventory of Self-Propelled Artillery by Caliber in 2002



	Iran	Iraq	Saudi	Bahrain	Kuwait	Oman	Qatar	UAE	Yemen
□ 203 mm	30								
□ 175 mm	30								
■ 170 mm	10								
□ 155 mm	160	95	200	13	59	18	28	177	
■ 152 mm		35							
□ 130 mm									
□ 122 mm	60	20							
■ 105 mm									
□ 100 mm									30

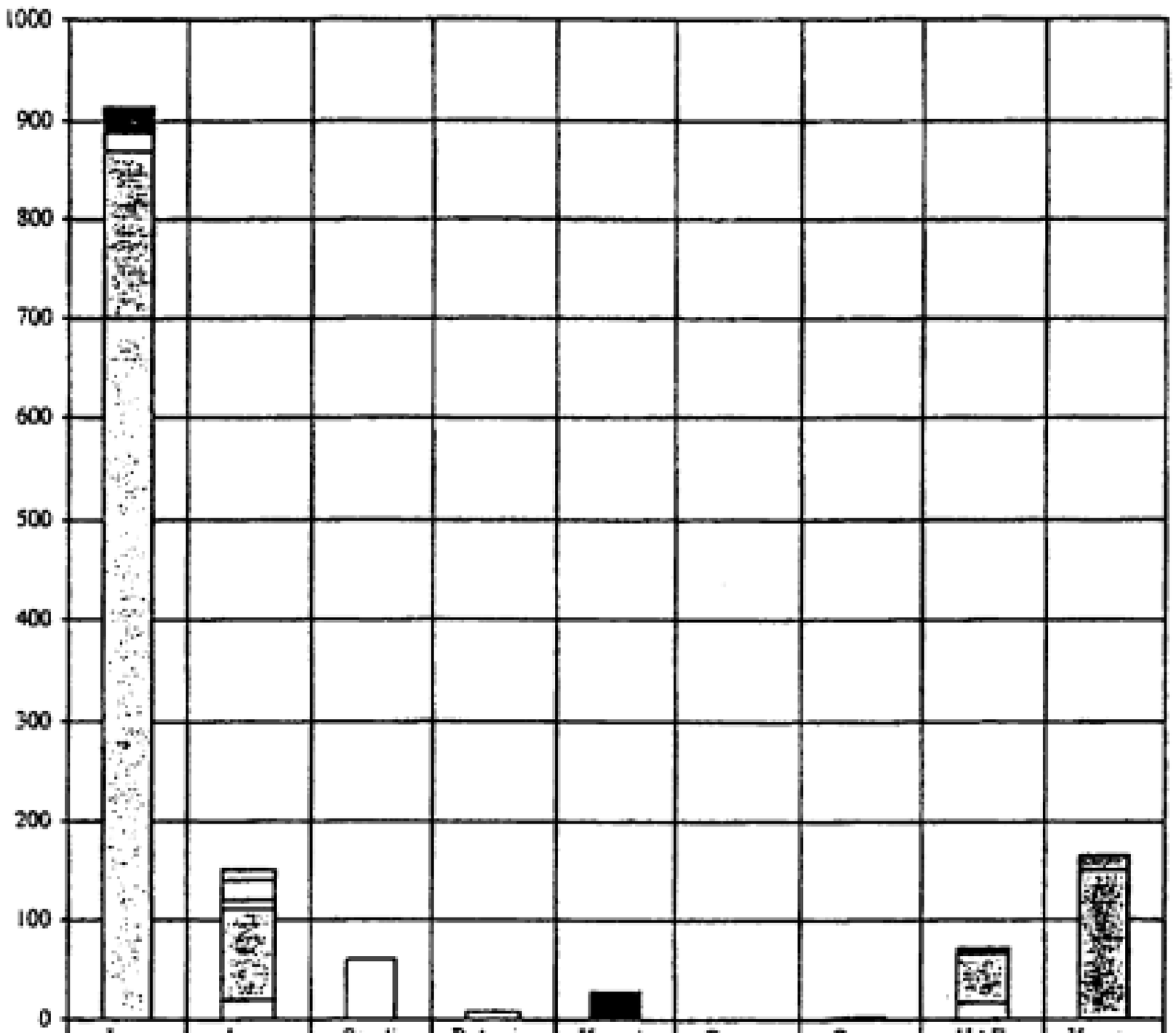
Note: Does not include weapons in full time storage, and does include Saudi National Guard and Iranian Revolutionary Guards.
Source: Adapted by Anthony H. Cordesman from the IISS, Military Balance, Periscope, Jane's Sentinel, and Jane's Defense Weekly

Copyright Anthony H. Cordesman, all rights reserved.

Digitized by Google

Original from
UNIVERSITY OF CALIFORNIA

Gulf Inventory of Multiple Rocket Launchers by Caliber in 2002



	Iran	Iraq	Saudi	Bahrain	Kuwait	Oman	Qatar	UAE	Yemen
■ 333 mm	12								
■ 320 mm	14								
■ 300 mm					27			6	
■ 290 mm									
◘ 262 mm		12							
◘ 240 mm	19								
◘ 227 mm				9					
■ 160 mm									
◘ 140 mm									14
◘ 132 mm		20							
◘ 127 mm		8	60				4		
◘ 122 mm	170	90						48	150
◘ 107 mm	700	20							
◘ 70 mm								18	

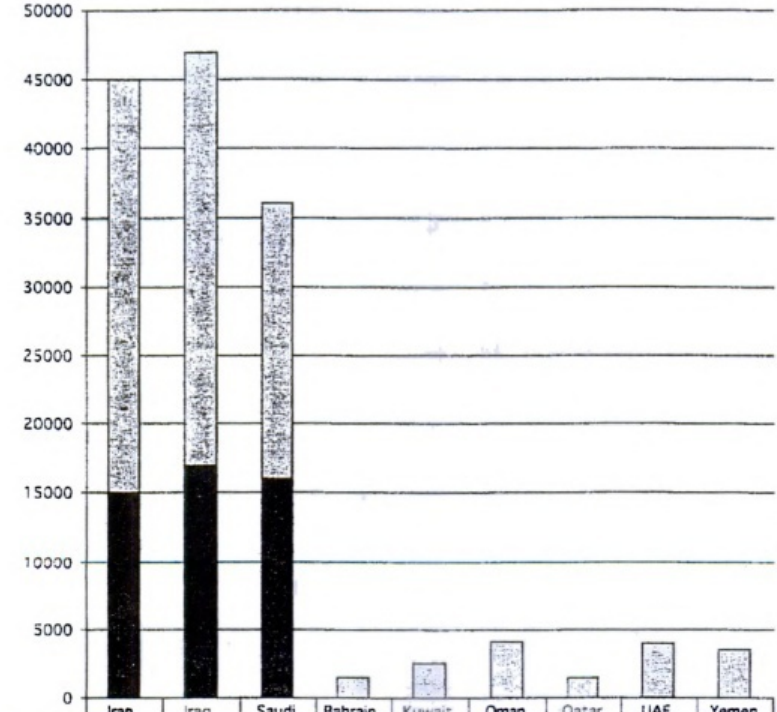
Note: Does not include weapons in full time storage, and does include Saudi National Guard and Iranian Revolutionary Guards.
Source. Adapted by Anthony H. Cordesman from the IISS, Military Balance, Periscope, Jane's Sentinel, and Jane's Defense Weekly.

Copyright Anthony H. Cordesman, all rights reserved.

Digitized by Google

Original from
UNIVERSITY OF CALIFORNIA

Total Gulf Air Force and Air Defense Manpower – 2002



	Iran	Iraq	Saudi	Bahrain	Kuwait	Oman	Qatar	UAE	Yemen
□ Air	30000	30000	20000	1500	2500	4100	1500	4000	3500
■ Air Def	15000	17000	16000	-	-	-	-		

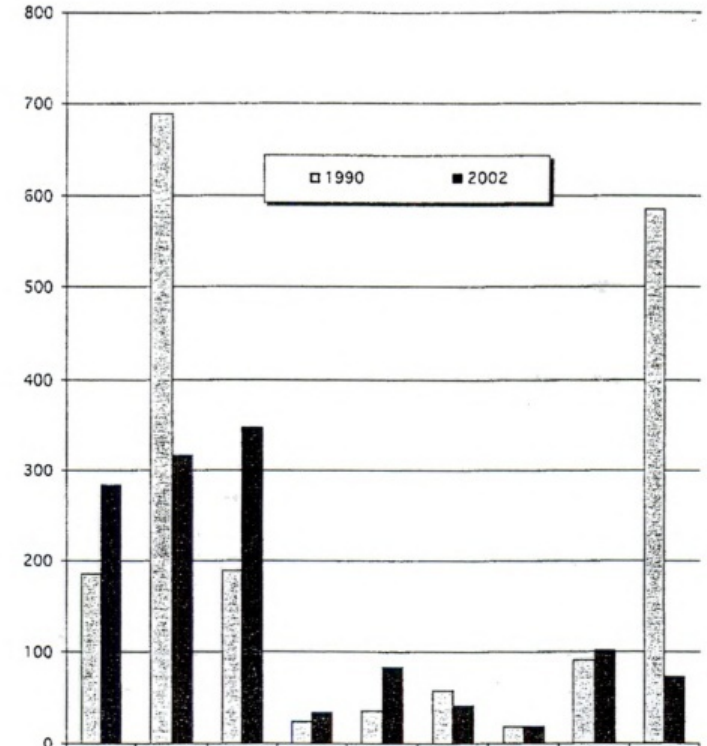
Source: Adapted by Anthony H. Cordesman from the IISS, Military Balance, Periscope, JCSS, Middle East Military Balance, Jane's Sentinel, and Jane's Defense Weekly, and material provided by US experts.

Copyright Anthony H. Cordesman, all rights reserved.

Digitized by Google

Original from UNIVERSITY OF CALIFORNIA

Total Operational Combat Aircraft in All Gulf Forces 1990-2002



	Iran	Iraq	Saudi Arabia	Bahrain	Kuwait	Oman	Qatar	UAE	Yemen
1990	185	689	189	24	35	57	18	91	585
2002	283	316	348	34	82	40	18	101	71

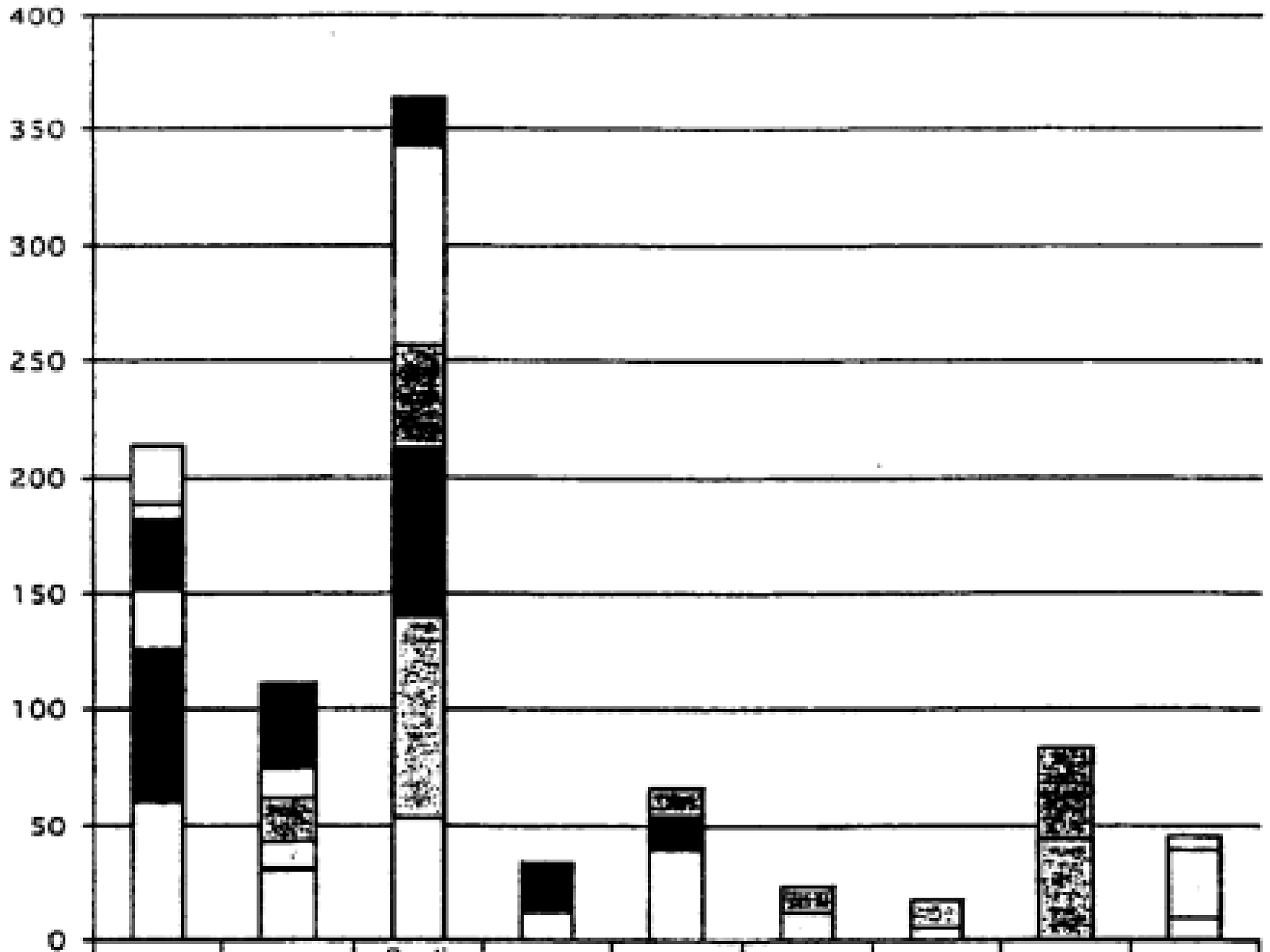
Source: Adapted by Anthony H. Cordesman from the IISS, Military Balance, Periscope, JCSS, Middle East Military Balance, Jane's Sentinel, and Jane's Defense Weekly, and material provided by US experts.

Copyright Anthony H. Cordesman, all rights reserved.

Digitized by Google

Original from UNIVERSITY OF CALIFORNIA

Gulf High and Medium Quality Fixed Wing Fighter, Fighter Attack, Attack, Strike, and Multi-Role Combat Aircraft By Type - 2002



	Iran	Iraq	Saudi Arabia	Bahrain	Kuwait	Oman	Qatar	UAE	Yemen
■ Tornado ADV		-	22	-	-	-	-	-	-
□ Tornado IDS	-	-	85	-	-	-	-	-	-
■ Hawk		-	45	-	12	12	-	39	-
□ Jaguar	-	-	-	-	-	12	-	-	-
□ Mirage 2000	-	-	-	-	-	-	12	44	-
■ Miruge F-1	-	38	-	-	14	-	-	-	-
□ Alpha	-	-	-	-	-	-	6		
□ MiG-29	25	12	-	-	-	-	-	-	5
□ M-25/25R	-	19	-	-	-	-	-	-	-
□ Su-25	7	12	-	-	-	-	-	-	-
■ Su-24D	30	1	-	-	-	-	-	-	-
□ Su-20/22	-	30	-	-	-	-	-	-	30
□ F-18	-	-	-	-	40	-	-	-	-
■ F-16	-	-	-	22	-	-	-	-	-
■ F-15S	-	-	72	-	-	-	-	-	-
□ F-15C/D	-	-	87	-	-	-	-	-	-
□ F-14	25	-	-	-	-	-	-	-	-
■ F-4E	66	-	-	-	-	-	-	-	-
□ F-5E/F	60	-	53	12	-	-	-	-	10

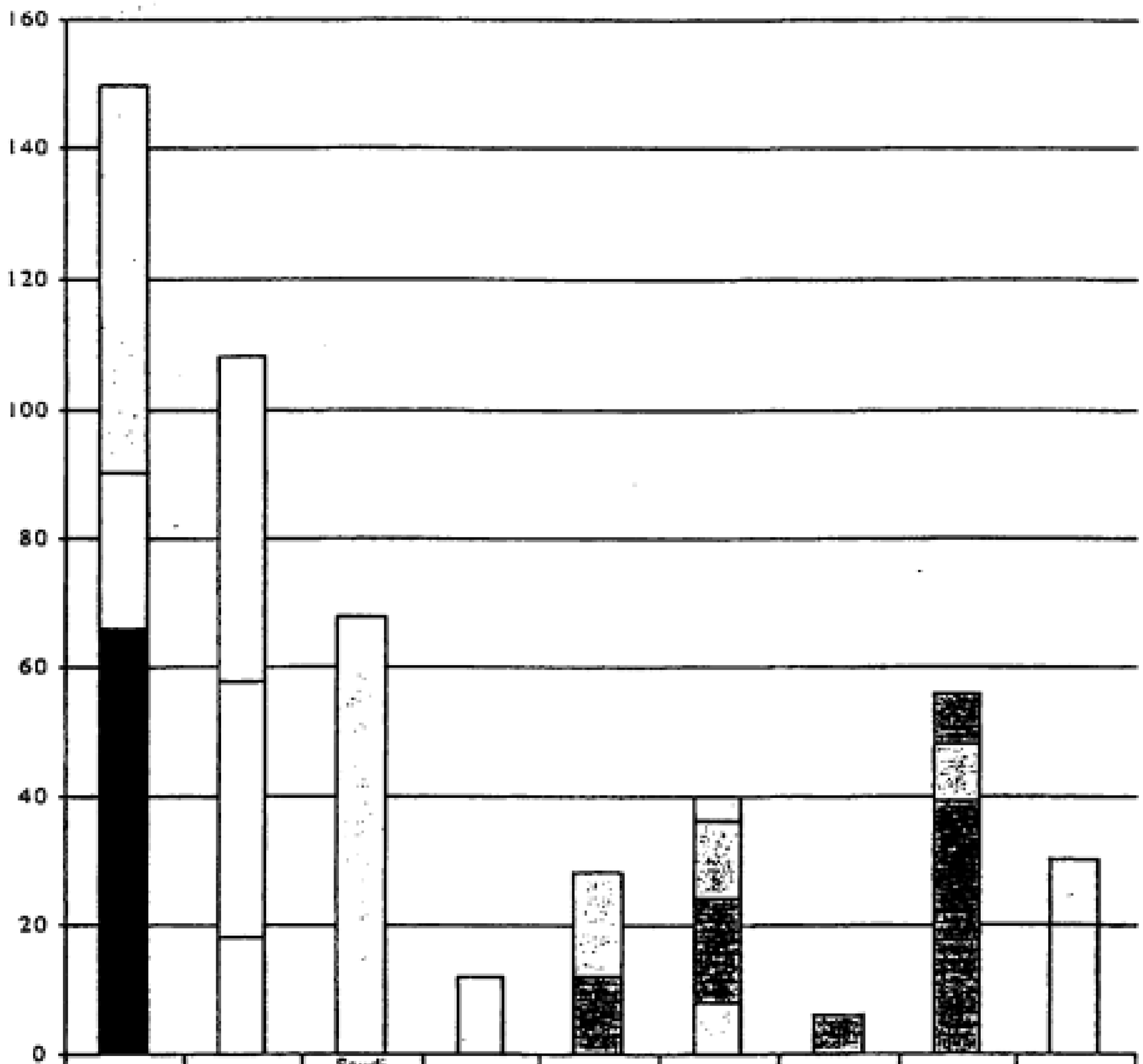
Source: Adapted by Anthony H. Cordesman from the IISS, Military Balance, Periscope, JCSS, Middle East Military Balance, Jane's Sentinel, and Jane's Defense Weekly, and material provided by US experts.

Copyright Anthony H. Cordesman, all rights reserved.

Digitized by Google

Original from
UNIVERSITY OF CALIFORNIA

Gulf Medium Quality Fixed Wing Fighter, Fighter Attack, Attack, Strike, and Multi-Role Combat Aircraft By Type - 2001



	Iran	Iraq	Saudi Arabia	Bahrain	Kuwait	Oman	Qatar	UAE	Yemen
MB-326	-	-	-	-	-	-	-	8	-
MB--339	-	-	-	-	-	-	-	9	-
Alpha	-	-	-	-	-	-	6		-
T-2	-	-	-	-	-	4	-	-	-
PC-9	-	-	-	-	-	12	-	-	-
Tucano	-	-	-	-	16	-	-	-	-
F-5	60	-	68	12	-	-	-	-	10
MiG-23	-	50	-	-	-	-	-	-	-
MiG-21	-	40	-	-	-	-	-	-	20
F-7M	24	18	-	-	-	-	-	-	-
Hawk		-		-	12	16	-	39	-
Jaguar	-	-	-	-	-	8	-	-	-
F-4E	66	-	-	-	-	-	-	-	-

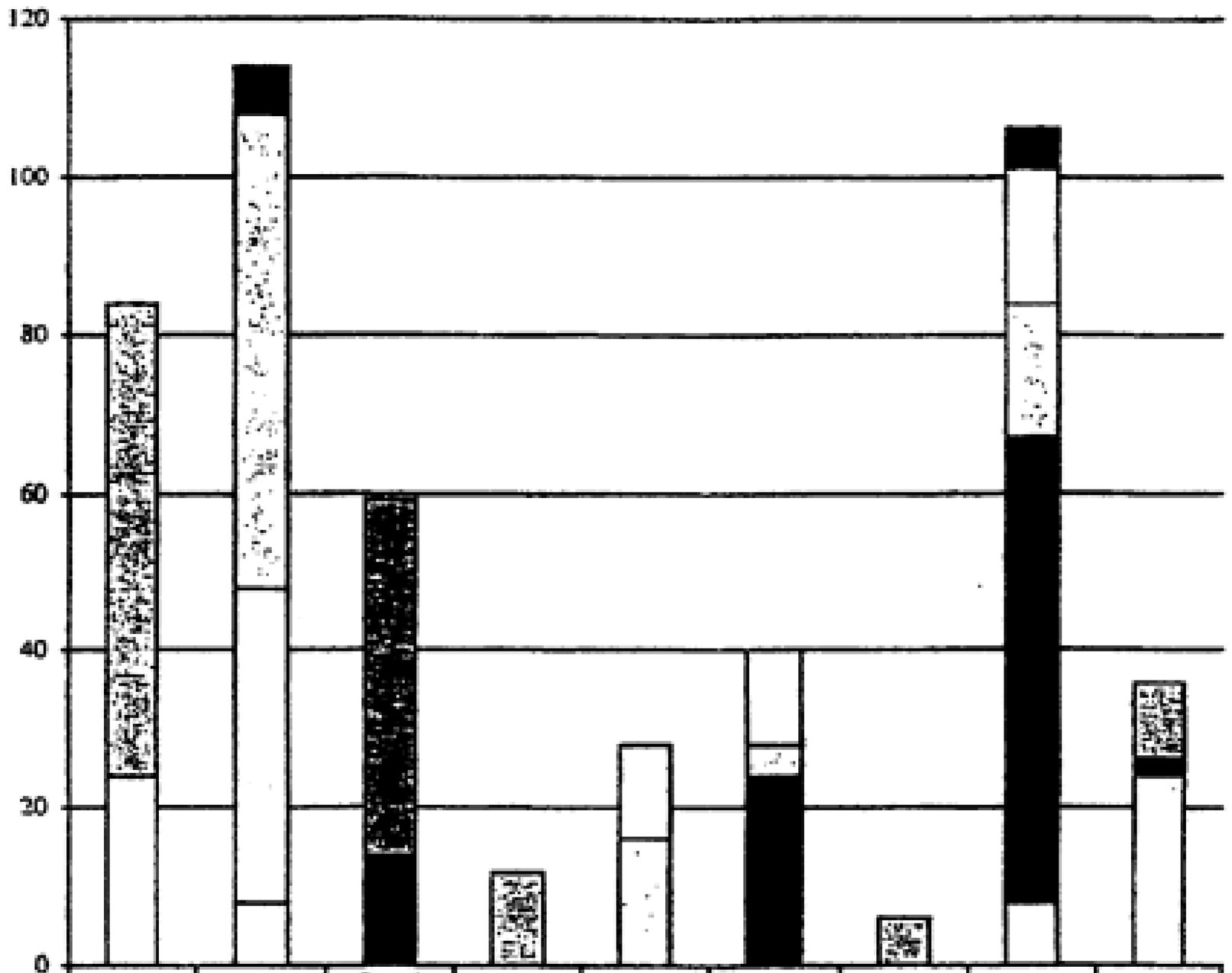
Source: Prepared by Anthony H. Cordesman, based upon discussions with U'S experts using data from the IISS Military Balance, the on-line edition of Jane's Sentinel Security Assessment, and the on-line edition of Periscope.

Copyright Anthony H. Cordesman, all rights reserved.

Digitized by Google

Original from
UNIVERSITY OF CALIFORNIA

Gulf Low Quality Fixed Wing Fighter, Fighter Attack, Attack, Strike, and Multi-Role Combat Aircraft By Type - 2002



	Iran	Iraq	Saudi Arabia	Bahrain	Kuwait	Oman	Qatar	UAB	Yemen
□ PC-9	-	-	-	-	-	12	-	-	-
■ HD-6/Tu-22	-	6	-	-	-	-	-	-	-
□ Hawk 64	-	-	-	-	12	-	-	-	-
■ Hawk 61								5	
□ Hawk 63		-	-	-	-	-	-	17	-
□ Hawk 65/65A		-	45	-	-	-	-		-
□ Hawk '02		-	-	-	-	4	-	17	-
■ Hawk '03		-	-	-	-	12	-		-
□ Alphajet	-	-	-	-	-	-	6	-	-
□ F-5E/F	60	-	*(53)	12	-	-	-	-	10
■ F-5A/B	-	-	14	-	-	-	-	-	2
□ MiG-23	-	60	-	-	-	-	-	-	-
□ MiG-21	-	40	-	-	-	-	-	-	24
□ Su-7	-	-	-	-	-	-	-	-	-
□ F-7	24	8	-	-	-	-	-	-	-
□ Tucano	-	-	-	-	16		-	-	-
■ BAC-167	-	-	-	-	-	12	-	-	-
■ MB-339	-	-	-	-	-	-	-	59	-
□ MB-326	-	-	-	-	-	-	-	8	-

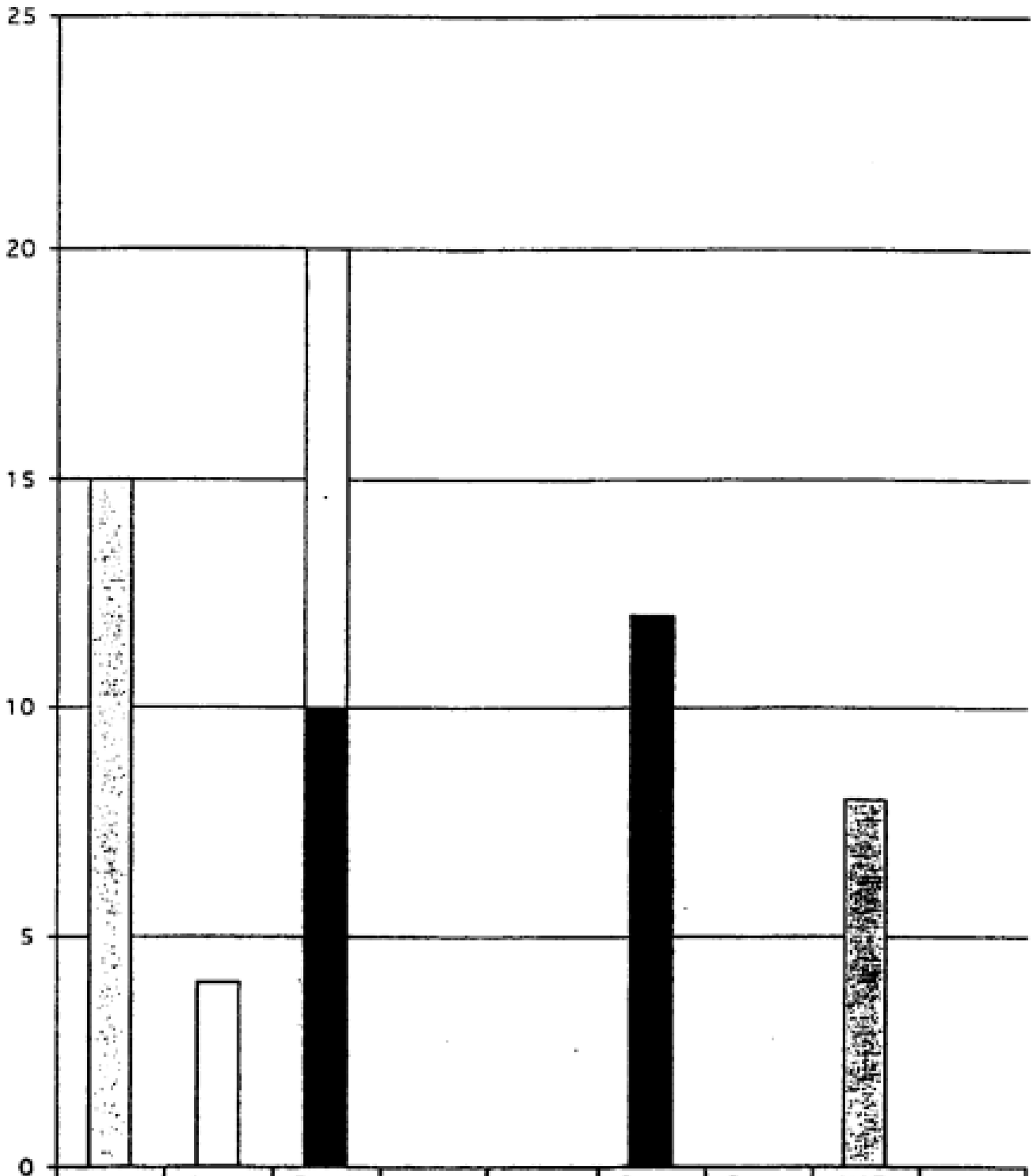
Source: Adapted by Anthony H. Cordesman from the IISS, Military Balance, Periscope, ICSS, Middle East Military Balance, Jane's Sentinel, and Jane's Defense Weekly, and material provided by US experts.

Copyright Anthony H. Cordesman, all rights reserved.

Digitized by Google

Original from
UNIVERSITY OF CALIFORNIA

Gulf Reconnaissance Aircraft in 2002



	Iran	Iraq	Saudi	Bahrain	Kuwait	Oman	Qatar	UAE	Yemen
□ Tornado FGA			10						
□ Mirage 2000 RAD								8	
□ MIG-25		4							
■ RF-5E			10						
□ RF-4E	15								
■ Hawk 203						12			

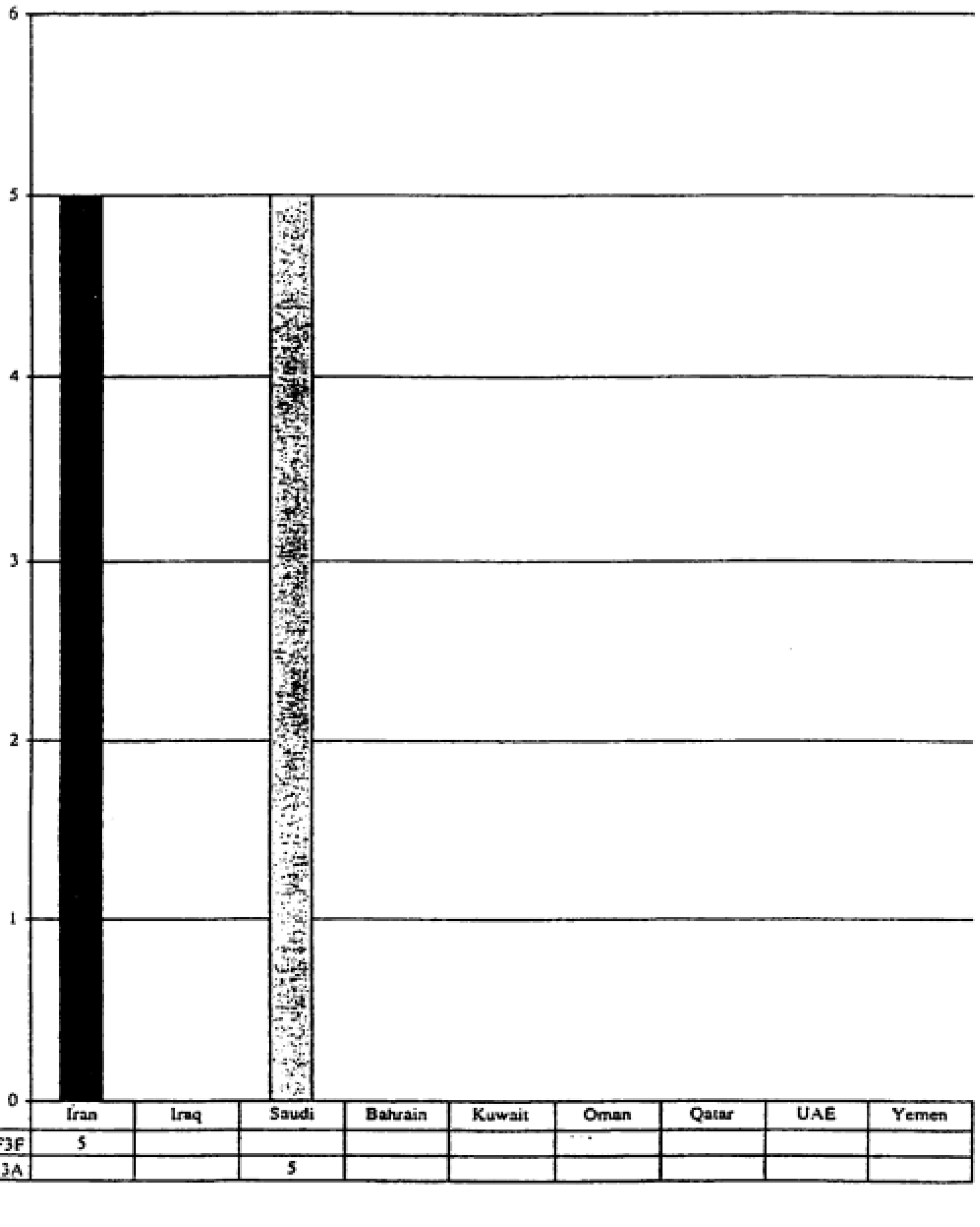
Source: Adapted by Anthony H. Cordesman from the IISS, Military Balance, Periscope, JCSS, Middle East Military Balance, Jane's Sentinel, and Jane's Defense Weekly, and material provided by US experts.

Copyright Anthony H. Cordesman, all rights reserved

Digitized by Google

Original from
UNIVERSITY OF CALIFORNIA

Sensor, AWACs, C4I, EW and Elint Aircraft in 2002



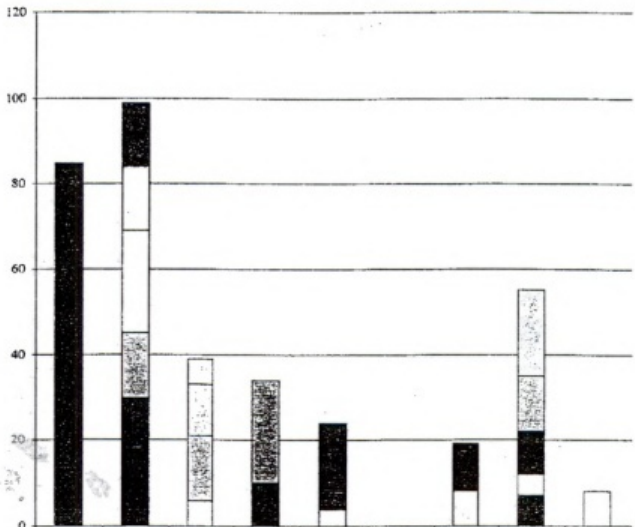
Source: Adapted by Anthony H. Cordesman from the IISS, Military Balance, Periscope, JCSS, Middle East Military Balance, Jane's Sentinel, and Jane's Defense Weekly and material provided by US experts.

Copyright Anthony H. Cordesman, all rights reserved.

Digitized by Google

Original from
UNIVERSITY OF CALIFORNIA

Gulf Attack Helicopters in 2002



	Iran	Iraq	Saudi	Bahrain	Kuwait	Oman	Qatar	UAE	Yemen
TAH-1P			6						
AH-64			12					20	
AS-565 Panther			15					13	
SA-342K HOT					16		11	10	
AH-1E				24					
AH-1J	85								
S-342		15			4				
Commando Exocet							8		
AS-332 Exocet			6		4			5	
SA-321 Exocet		15							
S-70A1									
Mi-35									8
Mi-24		24							
AB-212				10					
SA-315 AS-12		15							
SA-316/319 SS11/12		12						7	
BO-105 AS-11/HOT		18							

Source: Adapted by Anthony H. Cordesman from the IISS, Military Balance, Periscope, ICSS, Middle East Military Balance, Jane's Sentinel, and Jane's Defense Weekly, and material provided by US experts.

Copyright Anthony H. Cordesman, all rights reserved.

Digitized by Google

Original from UNIVERSITY OF CALIFORNIA

Gulf Land-Based Air Defense Systems in 2002

Country	Major SAM	Light SAM	AA Guns
Bahrain	8 I Hawk	60 RBS-70 18 Stinger ? Crotale	15 Oerlikon 35 mm 12 L/70 40 mm
Iran	16/150 I Hawk 3/10 SA-5 45 HQ-2J (SA-2) ? SA-2	SA-7 HN-5 5/30 Rapier FM-80 (Ch Crotale) 15 Tigercat SA-7 Stinger (?)	1,700 Guns ZU-23, ZSU-23-4, ZSU-57-2, KS-19 ZPU-2/4, M-1939, Type 55
Iraq	SA-2 SA-3 SA-6	Roland 1,500 SA-7 (SA-8 (SA-9 (SA-13 (SA-14, SA-16	6,000 Guns ZSU-23-4 23 mm, M-1939 37 mm, ZSU-57-2 SP, 57 mm 85 mm, 100 mm, 130 mm
Kuwait	4/24 I Hawk 4/16 Patriot	6/12 Aspede 48 Starburst	6/2X35mm Oerlikon
Oman	None	Blowpipe 34 SA-7 14 Javelin 40 Rapier	10 GDF 35 mm 4 ZU-23-2 23 mm 12 L-60 40 mm
Qatar	None	10 Blowpipe 12 Stinger 9 Roland 20 SA-7, 24 Mistral	?
Saudi Arabia	16/128 I Hawk 8/? Patriot	189 Crotale 400 Stinger 500 Mistral 500 Redeye 17/68 Shahine mobile 40 Crotale 73 Shahine static	50-73 AMX-30SA 30 mm 92 M-163 Vulcan 150 L-70 40 mm (in store)
UAE	5/30 I Hawk Bty.	20+ Blowpipe Mistral 12 Rapier 9 Crotale 13 RBS-70 100 Mistral	42 M-3VDA 20 mm SP 20 GCF-BM2 30 mm
Yemen	SA-2, SA3, SA-6	SA-7, SA-9, SA13, SA-14 800 SA-7/9/13/14	50 M-167 20mm 20 M-163 Vulcan 20mm 100 ZSU-23-4 23 mm 150 M-1939 23 mm 120 S-60 37 mm KS-12 85 mm

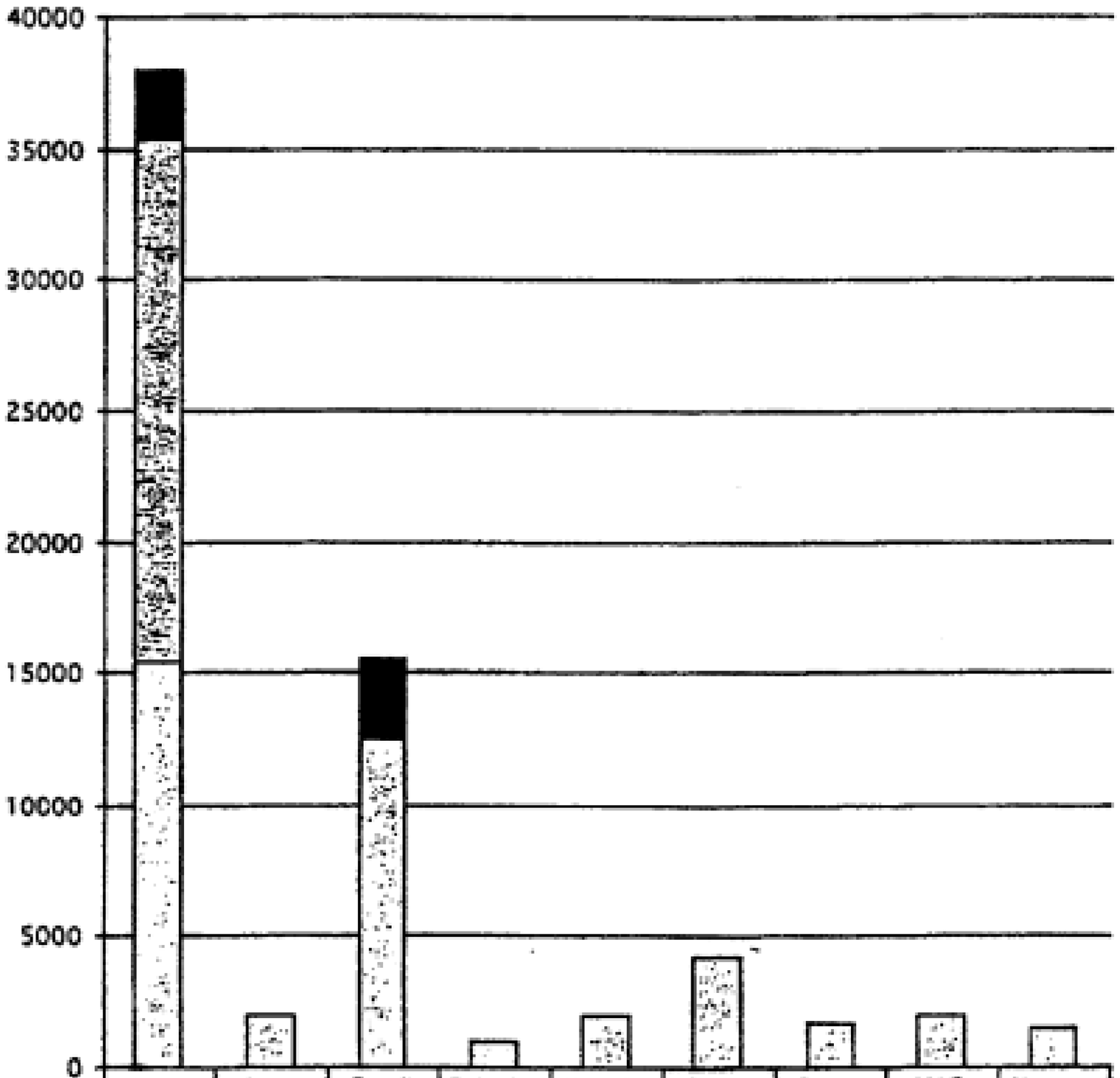
Source: Adapted by Anthony H. Cordesman from the IISS, Military Balance, Periscope, JCSS, Middle East Military Balance, Jane's Sentinel, and Jane's Defense Weekly, and material provided by US experts. Some data adjusted or estimated by the author.

Copyright Anthony H. Cordesman, all rights reserved.

Digitized by Google

Original from
UNIVERSITY OF CALIFORNIA

Total Gulf Naval Manpower in 2002



	Iran	Iraq	Saudi	Bahrain	Kuwait	Oman	Qatar	UAE	Yemen
■ Marines	2600		3000						
□ Naval Gaurds	20000								
□ Regular Navy	15400	2000	12500	1000	2000	4200	1730	2000	1500

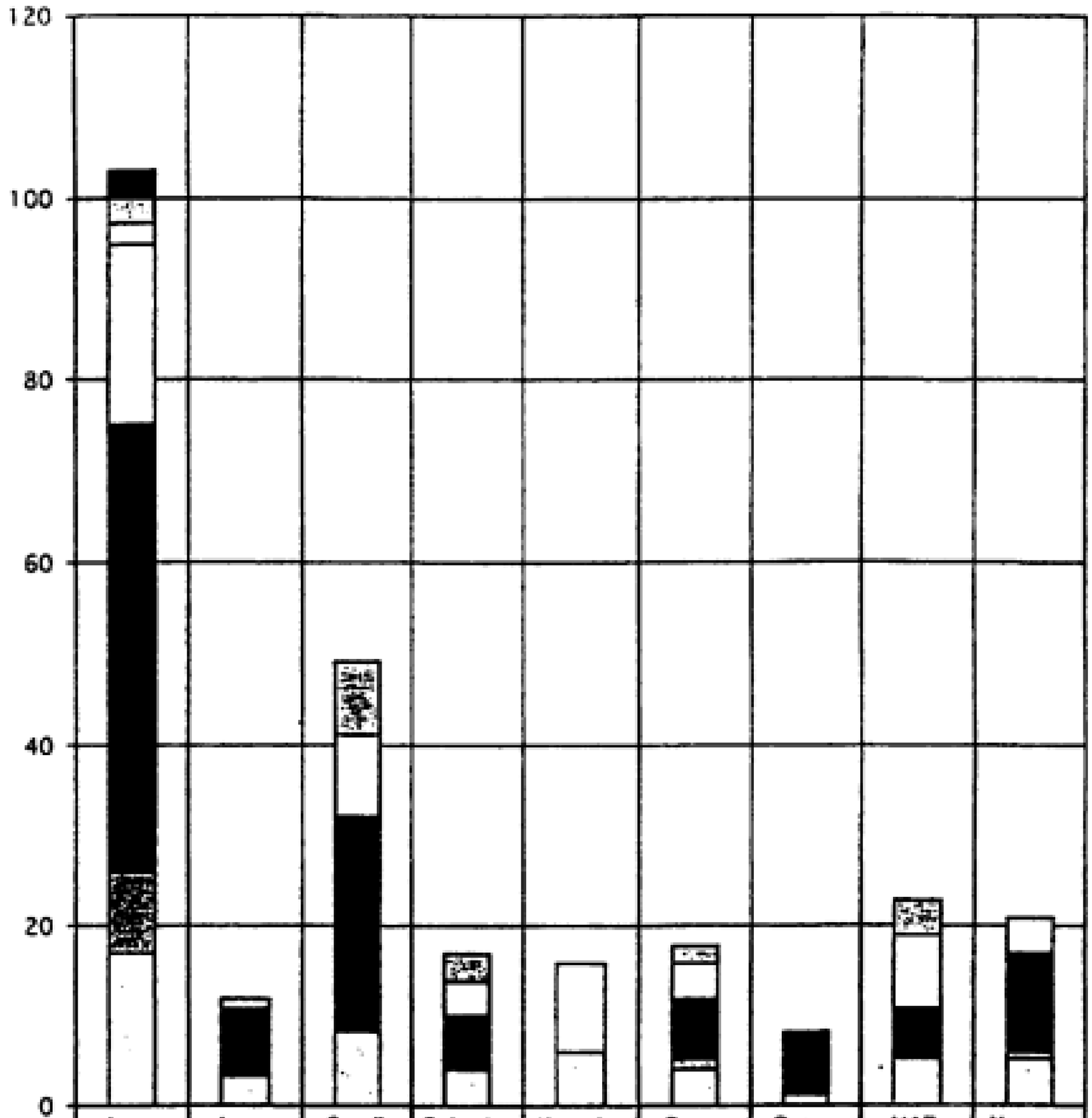
Source: Adapted by Anthony H. Cordesman from the IISS, Military Balance, Periscope, JCSS, Middle East Military Balance., Jane's Fighting Ships, 2000-2001, Jane's Sentinel, and Jane's Defense Weekly, and material provided by US experts.

Copyright Anthony H. Cordesman, all rights reserved.

Digitized by Google

Original from
UNIVERSITY OF CALIFORNIA

Gulf Naval Ships by Category in 2002



	Iran	Iraq	Saudi	Bahrain	Kuwait	Oman	Qatar	UAE	Yemen
■ Submarines	3								
▣ Major Missile Combat	3		8	3		2		4	
□ Major Other Combat	2								
□ Missile Patrol	20	1	9	4	10	4		8	4
■ Other Patrol	42	5	17	6		7	7	6	5
■ Mine	7	3	7						6
▣ Amphibious	9					1			1
□ Landing Craft	17	3	8	4	6	4	1	5	5

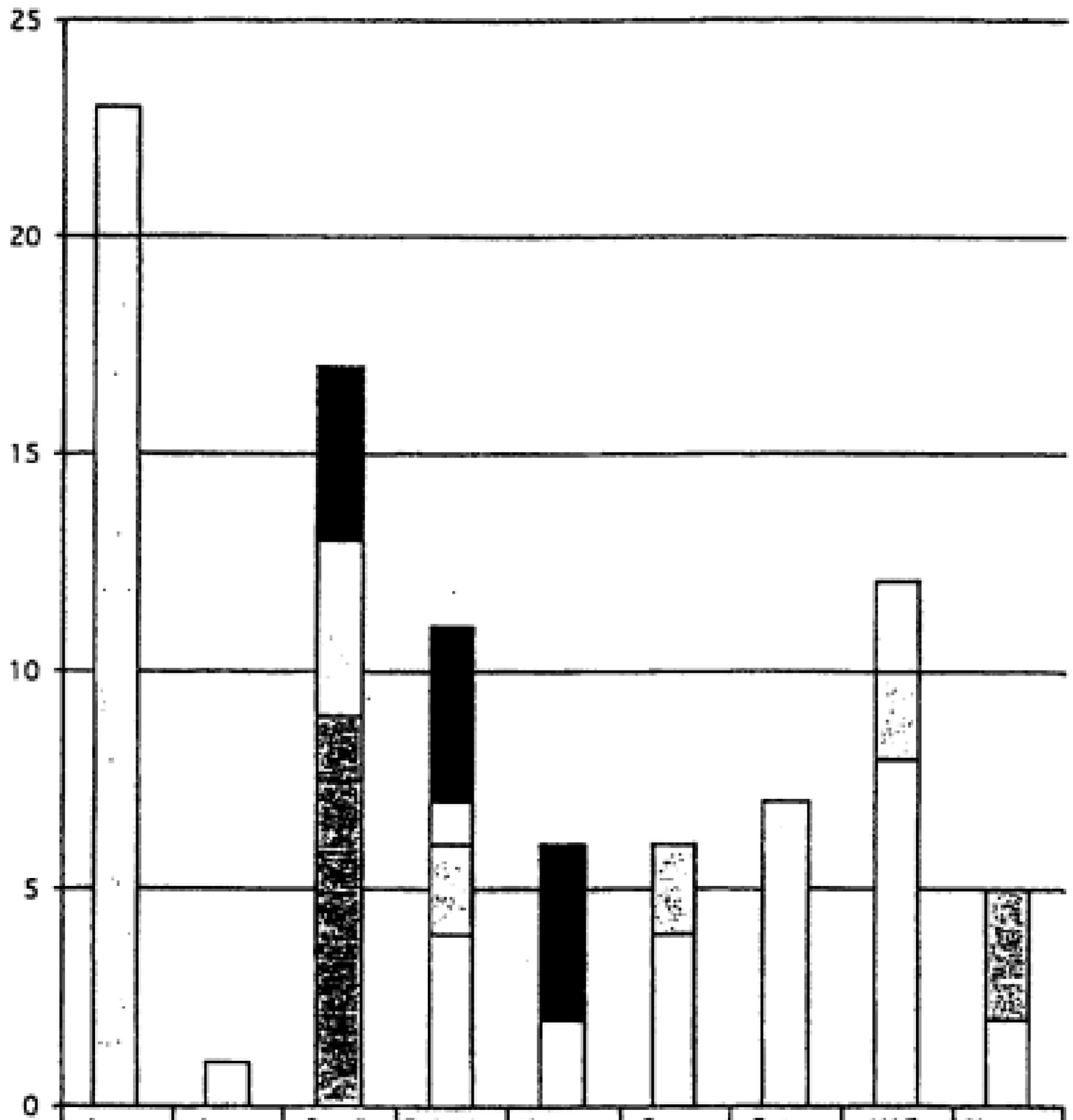
Source: Adapted by Anthony H. Cordesman from the IISS, Military Balance, Periscope, JCSS, Middle East Military Balance, Jane's Fighting Ships, 2000-2001, Jane's Sentinel, and Jane's Defense Weekly, and material provided by US experts.

Copyright Anthony H. Cordesman, all rights reserved.

Digitized by Google

Original from
UNIVERSITY OF CALIFORNIA

Gulf Warships with Anti-Ship Missiles in 2002



	Iran	Iraq	Saudi	Bahrain	Kuwait	Oman	Qatar	UAE	Yemen
■ Frigates with Exocet	-	-	4	4	-	-	-	-	-
□ Frigates with Harpoon	-	-	-	1	-	-	-	2	-
□ Frigates with Sea Killer	3	-	-	-	-	-	-	-	-
□ Corvettes with Exocet	-	-	-	2	-	2	-	2	-
□ Corvettes with Harpoon		-	4	-	-	-	-	-	-
□ Patrol Craft with Harpoon	-	-	9	-	-	-	-	-	-
□ Patrol Craft with C-802	20	-	-	-	-	-	-	-	-
■ Patrol Craft with Sea Skua		-	-	-	4		-	-	-
□ Patrol Craft with Exocet	-	-	-	4	2	4	7	8	-
□ Patrol Craft with C-801		-	-	-	-	-	-	-	3
□ Patrol Craft with SS-N-2A	-	1	-		-	-	-	-	2

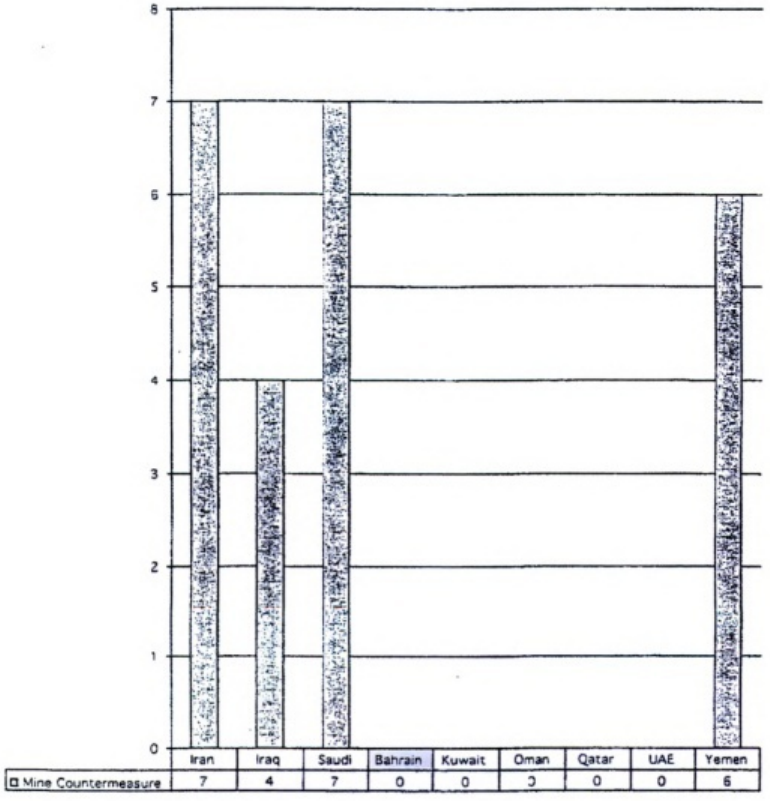
Source: Adapted by Anthony H. Cordesman from the IISS, Military Balance, Periscope, JCSS, Middle East Military Balance, Jane's Fighting Ships, 2000-2001, Jane's Sentinel, and Jane's Defense Weekly, and material provided by US experts.

Copyright Anthony H. Cordesman, all rights reserved

Digitized by Google

Original from
UNIVERSITY OF CALIFORNIA

Gulf Mine Warfare Ships in 2002



	Iran	Iraq	Saudi	Bahrain	Kuwait	Oman	Qatar	UAE	Yemen
Mine Countermeasure	7	4	7	0	0	0	0	0	6

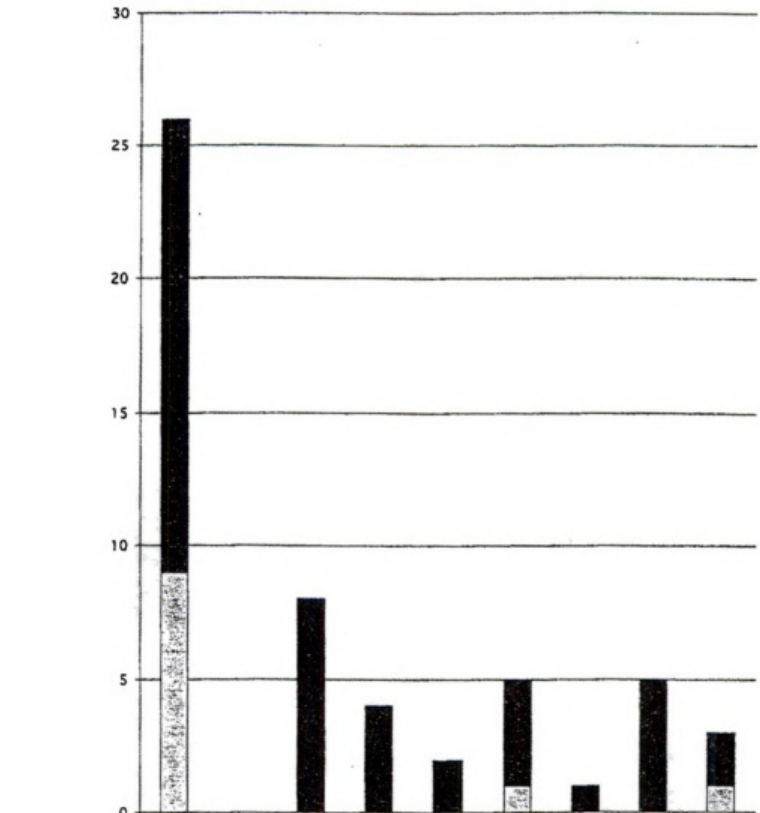
Source: Adapted by Anthony H. Cordesman from the IISS, Military Balance, Periscope, JCSS, Middle East Military Balance., Jane's Fighting Ships, 2000-2001, Jane's Sentinel, and Jane's Defense Weekly., and material provided by US experts

Copyright Anthony H. Cordesman, all rights reserved.

Digitized by Google

Original from UNIVERSITY OF CALIFORNIA

Gulf Amphibious Warfare Ships in 2002



	Iran	Iraq	Saudi	Bahrain	Kuwait	Oman	Qatar	UAE	Yemen
■ Landing Craft	17		8	4	2	4	1	5	2
□ Amphibious Ships	9					1			1

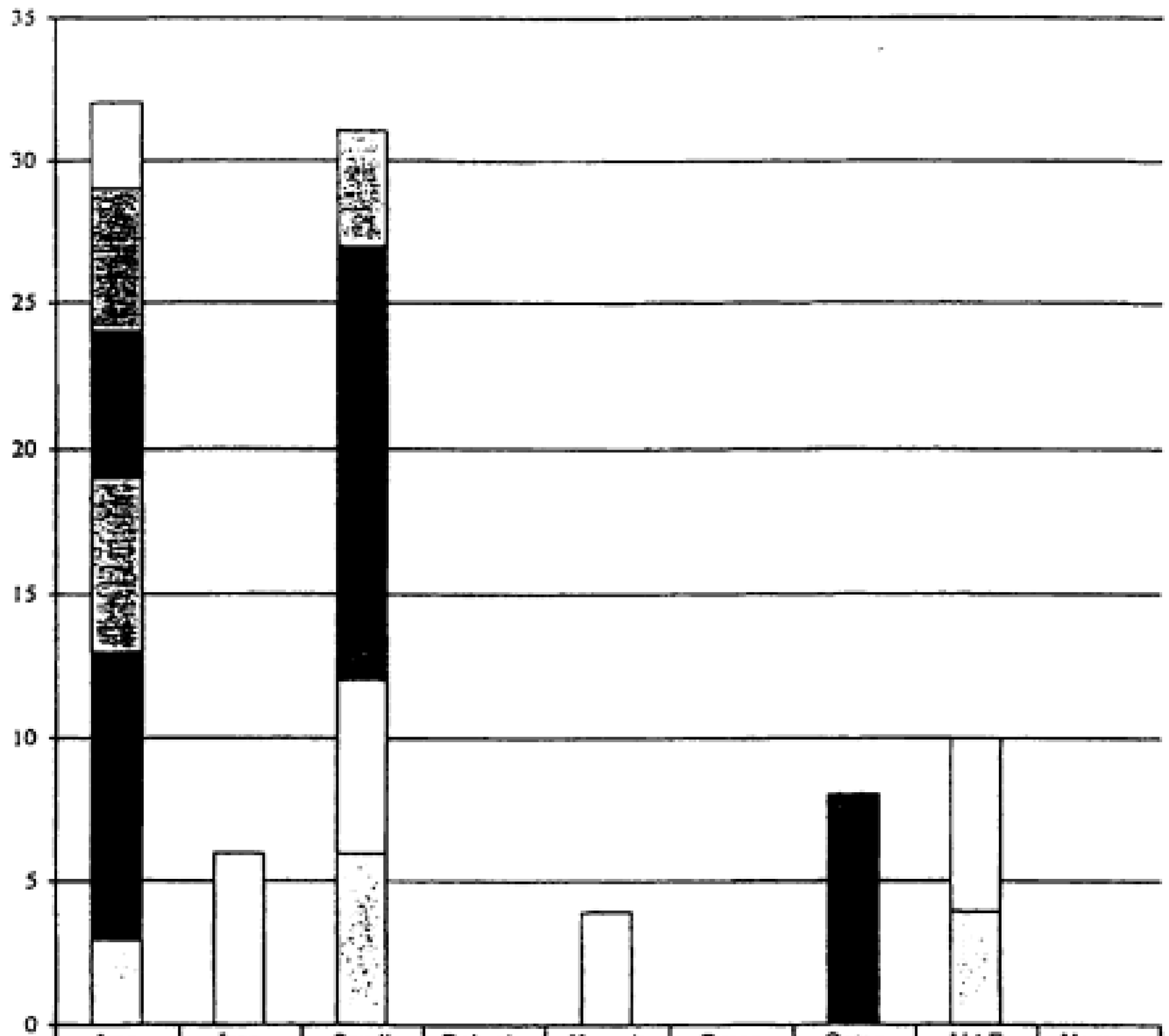
Source: Adapted by Anthony H. Cordesman from the IISS, Military Balance, Periscope, JCSS, Middle East Military Balance, Jane's Fighting Ships, 2000-2001, Jane's Sentinel, and Jane's Defense Weekly, and material provided by US experts.

Copyright Anthony H. Cordesman, all rights reserved.

Digitized by Google

Original from UNIVERSITY OF CALIFORNIA

Gulf Naval Aircraft and Helicopters Aircraft in 2002



	Iran	Iraq	Saudi	Bahrain	Kuwait	Oman	Qatar	UAE	Yemen
□ PF-3 MR	3								
□ C-130H-MP	5								
■ DO-25 MR	5								
□ AS-585								6	
□ AS-565 Sar			4						
■ AS-565 AS-15TT			15						
□ AS-332 Exocet			6						
□ AS-332 Tpt			6						
□ AS-332 SAR/Attack					4				
□ SA-321 Exocet		6							
□ SA-316								4	
□ AB-212 ASW	6								
■ Commando-Exocet							8		
■ SH-3D ASW	10								
□ RH-53D MCM	3								
Total		40	0 31		0	0	0	8	15 0

Source: Adapted by Anthony H. Cordesman from the IISS, Military Balance, Perscope, JCSS, Middle East Military Balance, Jane's Fighting Ships, 2000-2001, Jane's Sentinel, and Jane's Defense Weekly, and material provided by US experts.

Copyright Anthony H. Cordesman, all rights reserved.

Digitized by Google

Original from
UNIVERSITY OF CALIFORNIA

Gulf Arms Buys by Supplier: 1987-2000

(New arms agreements in current US $millions)

Buyer Country	Supplier Country						
	US	Russia	China	Major West European	Other European	All Others	Total
Iran							
1987-90	0	3,500	2,300	200	1,200	1,600	8,800
1991-94	0	200	200	100	100	600	1,200
1995-98	0	200	800	0	300	100	1,400
1996-99	0	200	800	0	100	0	1,100
1997-2000	0	300	600	100	100	200	1,300
Iraq							
1987-90	0	300	700	500	500	1,000	3,000
1991-94	0	0	0	0	0	0	0
1995-98	0	0	0	0	0	0	0
1996-99	0	0	0	0	0	0	0
1997-2000	0	0	0	0	0	0	0
Bahrain							
1987-90	300	0	0	0	0	0	300
1991-94	200	0	0	0	0	0	200
1995-98	500	0	0	0	0	0	500
1996-99	500	0	0	0	0	0	500
1997-2000	700	0	0	0	0	0	700
Kuwait							
1987-90	2,500	200	0	200	200	200	3,300
1991-94	3,500	800	0	1,800	0	100	6,200
1995-98	900	0	200	700	100	0	1,900
1996-99	800	0	200	100	0	0	1,100
1997-2000	500	0	200	0	0	0	700
Oman							
1987-90	100	0	0	600	0	0	700
1991-94	0	0	0	500	0	100	600
1995-98	0	0	0	300	100	100	500
1996-99	0	0	0	300	100	0	400
1997-2000	0	0	0	300	100	0	400
Qatar							
1987-90	0	0	0	0	0	0	0
1991-94	0	0	0	2,000	0	0	2,000
1995-98	0	0	0	900	0	0	900
1996-99	0	0	0	800	0	0	800
1997-2000	0	0	0	0	0	0	0
Saudi Arabia							
1987-90	18,800	200	300	23,000	2,300	200	44,800
1991-94	15,600	0	0	6,600	100	0	22,300
1995-98	5,100	0	0	1,700	800	300	7,900
1996-99	5,500	0	0	400	900	300	7,100
1997-2000	4,300	0	0	0	1,100	300	5,700
UAE							
1987-90	300	0	0	300	0	400	1,000
1991-94	300	500	0	3,900	100	0	4,800
1995-98	100	400	0	6,000	800	100	7,400
1996-99	300	400	0	6,000	800	200	7,700
1997-2000	6,800	800	-	6,000	200	200	14,000

0 = less than $50 million or nil. and all data rounded to the nearest $100 million.
Source: Richard F. Grimmett, Conventional Arms Transfers to the Developing Nations, Congressional Research Service, various editions.

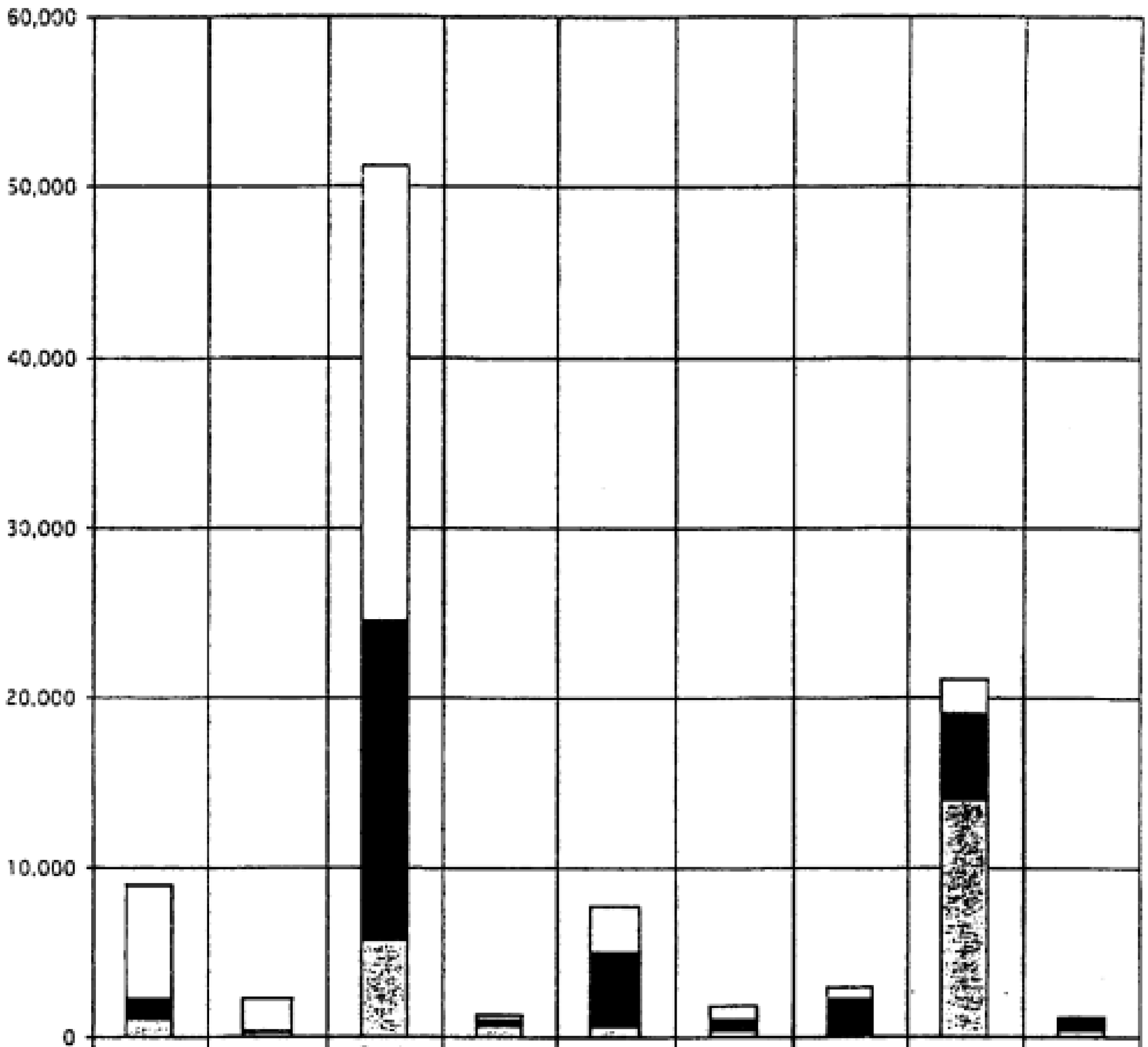
Copyright Anthony H. Cordesman, all rights reserved.

Digitized by Google

Original from
UNIVERSITY OF CALIFORNIA

Total Gulf New Arms Agreements from the Gulf War to 2000

($Current US Millions)



	Iran	Iraq	Saudi Arabia	Bahrain	Kuwait	Oman	Qatar	UAE	Yemen
□ 1989-1992	6,700	1,800	26,700	300	2,900	800	700	2,000	100
■ 1993-1995	1,200	190	18,800	300	4,300	700	2,200	5,000	700
▫ 1997-2000	1,100	220	5,700	700	700	400	0	14,000	400

0 = less than $50 million or nil, and all data rounded to the nearest $100 million.
Source: Richard F. Grimmett, Conventional Arms Transfers to the Developing Nations, Congressional Research Service, various editions.

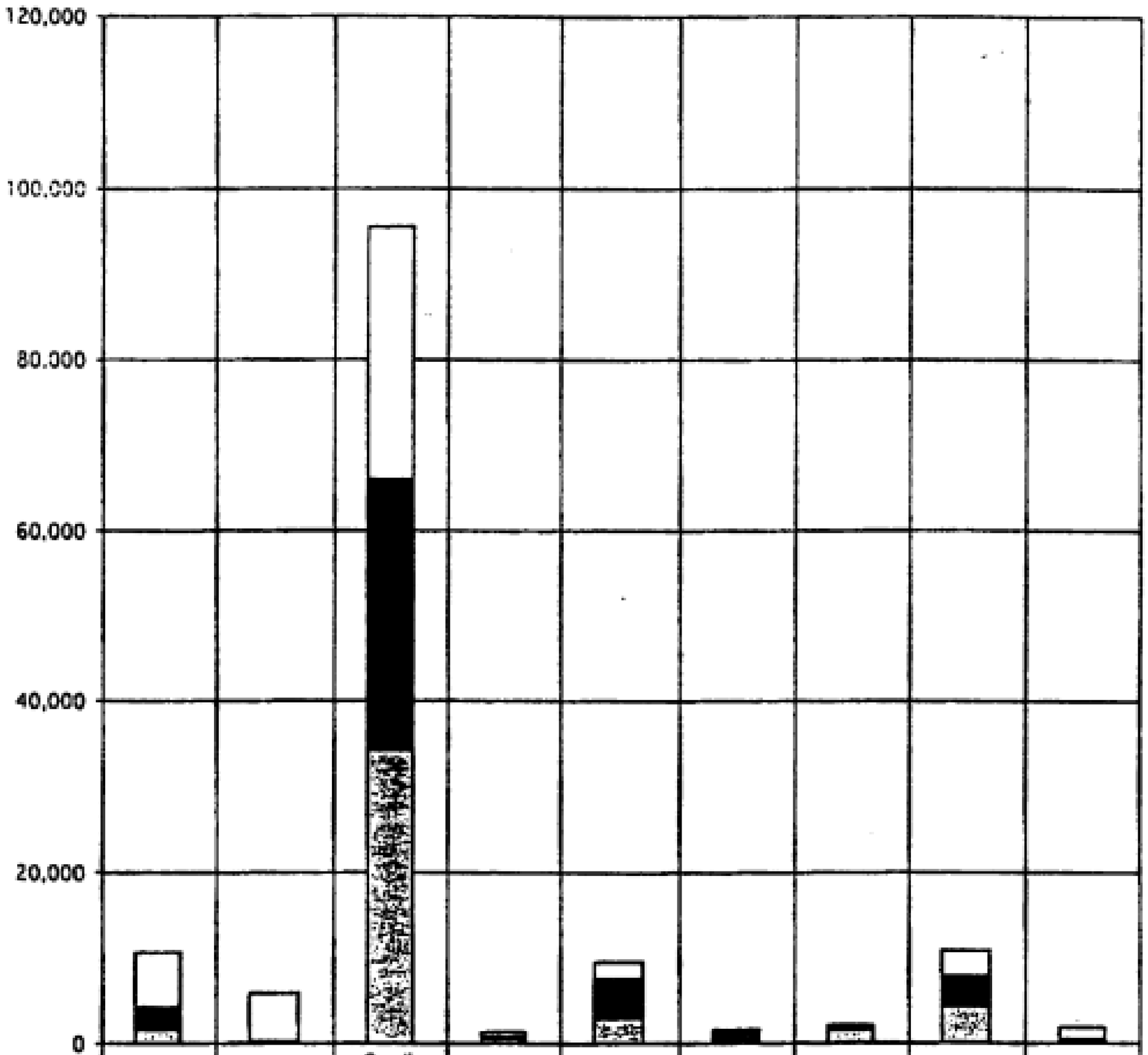
Copyright Anthony H. Cordesman, all rights reserved.

Digitized by Google

Original from
UNIVERSITY OF CALIFORNIA

Total Gulf New Arms Deliveries from the Gulf War to 2000

($Current US Millions)



	Iran	Iraq	Saudi Arabia	Bahrain	Kuwait	Oman	Qatar	UAE	Yemen
1989-1992	6,300	5,500	29,600	500	2,000	200	300	2,900	1,200
1993-1996	2,600	190	31,900	200	4,600	1,200	0	3,700	400
1997-2000	1,700	190	34,000	500	3,000	200	1,700	4,200	200

0 = less than $50 million or nil, and all data rounded to the nearest $100 million.
Source: Richard F. Grimmett, Conventional Arms Transfers to the Developing Nations, Congressional Research Service, various editions.

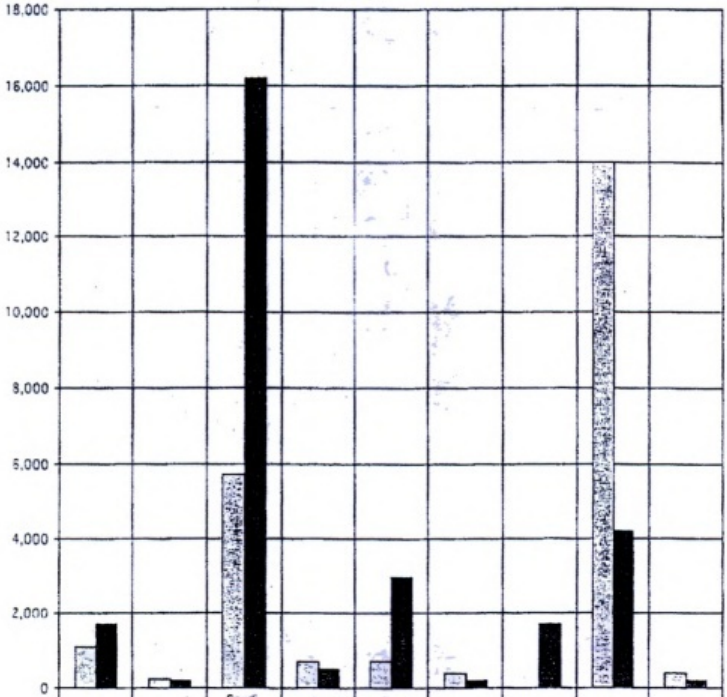
Copyright Anthony H. Cordesman, all rights reserved.

Digitized by Google

Original from
UNIVERSITY OF CALIFORNIA

Total Gulf New Arms Agreements and Deliveries 1997-2000

($Current US Millions)



	Iran	Iraq	Saudi Arabia	Bahrain	Kuwait	Oman	Qatar	UAE	Yemen
□ Agreements	1,100	220	5,700	700	700	400	0	14,000	400
■ Deliveries	1,700	190	16,200	500	3,000	200	1,700	4,200	200

0 = less than $50 million or nil, and all data rounded to the nearest $100 million.
Source: Richard F. Grimmett, Conventional Arms Transfers to the Developing Nations, Congressional Research Service, various editions.

Copyright Anthony H. Cordesman, all rights reserved.

Digitized by Google

Original from
UNIVERSITY OF CALIFORNIA

Iraq - Overview

- Iraqi purchases matched Saudi purchases during the mid-1980s, but Iraqi deliveries in current US dollars dropped from $11 billion annually during 1988-1991 to below $200 million annually in 1992-1995.

- Comparisons of Iraqi new agreements and arms deliveries by supplier country reveal a drastic decline in new agreements before the Gulf War that would have seriously compromised Iraq's import-dependent forces even without the Gulf War.

  - New agreements with Russia dropped from $11.8 billion in 1983-1986 to $4.1 billion in 1987-1990, before dropping to zero after 1991.

  - New agreements with China dropped from $1.7 billion in 1983-1986 to $0.6 billion in 1987-1990, before dropping to zero after 1991.

  - New agreements with E. Europe dropped from $4.0 billion in 1983-1986 to $1.0 billion in 1987-1990, before dropping to zero after 1991.

  - In contrast, new agreements with the major West European states rose from $1.0 billion in 1983-1986 to $2.7 billion in 1987-1990, before dropping to "zero" for everything but minor deliveries of smuggled parts and equipment after 1991 -- reflecting Iraq's growing interest in advanced military technology before the cutoff of arms imports.

- In spite of various claims, Iraq's domestic production capability can only play a major role in allowing Iraq to sustain its modern weapons and ability to use advanced military technology. Iraq remains an import dependent country.

  - Iraq's past pattern of arms imports makes it highly dependent on access to a wide range of suppliers -- particularly Western Europe and Russia. Even if one nation should resume supply, Iraq could not rebuild its military machine without broad access to such suppliers and would be forced to convert a substantial amount of its order of battle to whatever supplier(s) were willing to sell.

  - In spite of some smuggling, Iraq has had negligible export earnings since 1990, and faces significant long term limits on its ability to import even when sanctions are lifted.

  - Iraq will encounter severe problems after UN sanctions are lifted because of the inability of the FSU to provide efficient deliveries of spares and cost-effective upgrade and modernization packages.

  - No accurate data are available on Iraqi military spending and arms imports since 1991, but estimates of trends in constant dollars, using adjusted US government data, strongly indicate that Iraq would need to spend sums approaching $20 billion to recapitalize its force structure.

  - Major modernization efforts to counter US standards of capability could add $10 billion each to key modernization efforts like land-based air defense, air defense, air and missile strike capabilities, armored modernization, modernization of other land weapons, and reconstitution of the Iraqi Navy. Modernization to match Saudi levels of capability would be about half these totals.

Copyright Anthony H. Cordesman, all rights reserved.

Digitized by Google

Original from
UNIVERSITY OF CALIFORNIA

Iraqi Dependence on Decaying, Obsolete, or Obsolescent Major Weapons

Land Forces

- 600-700 M-48s, M-60s, AMX-30s, Centurions, and Chieftains captured from Iran or which it obtained in small numbers from other countries.
- 1,000 T-54, T-55, T-77 and Chinese T-59 and T-69 tanks
- 200 T-62s.
- 1,500-2,100 (BTR-50, BTR-60, BTR-152, OT-62, OT-64, etc
- 1,600 BDRM-2, EE-3, EE-9, AML-60, AML-90
- 800-1,200 towed artillery weapons (105 mm, 122 mm, 130 mm, and 155 mm).
- Unknown number of AS-11, AS-1, AT-1, crew-portable anti-tank-guided missiles.
- More than 1,000 heavy, low-quality anti-aircraft guns.
- Over 1,500 SA-7 and other low-quality surface-to-air guided missile launchers & fire units.
- 20 PAH-1 (Bo-105); attack helicopters with AS-11 and AS-12, 30 Mi-24s and Mi-25s with AT-2 missiles, SA-342s with AS-12s, Allouettes with AS-11s and AS-12s.
- 100-180 worn or obsolete transport helicopters.

Air Force

- 6-7 HD-6 (BD-6), 1-2 Tu-16, and 6 Tu-22 bombers.
- 100 J-6, MiG-23BN, MiG-27, Su-7 and Su-20.
- 140 J-7, MiG-21, MiG-25 air defense fighters.
- MiG-21 and MiG-25 reconnaissance fighters.
- 15 Hawker Hunters.
- Il-76 Adnan AEW aircraft.
- AA-6, AA-7, Matra 530 air-to-air missiles.
- AS-11, AS-12, AS-6, AS-14; air-to-surface missiles.
- 25 PC-7, 30 PC-9, 40 L-29 trainers.
- An-2, An-12, and Il-76 transport aircraft.

Air Defense

- 20-30 operational SA-2 batteries with 160 launch units.
- 25-50 SA-3 batteries with 140 launch units.
- 36-55 SA-6 batteries with over 100 fire units.
- 6,500 SA-7s.
- 400 SA-9s.
- 192 SA-13s

Navy

- *Ibn Khaldun*.
- Osa-class missile boat.
- 13 light combat vessels.
- 5-8 landing craft.
- *Agnadeen*.
- 1 Yugoslav Spasilac-class transport.
- Polnocny-class LST.

Source: Estimate made by Anthony H. Cordesman based discussions with US experts.

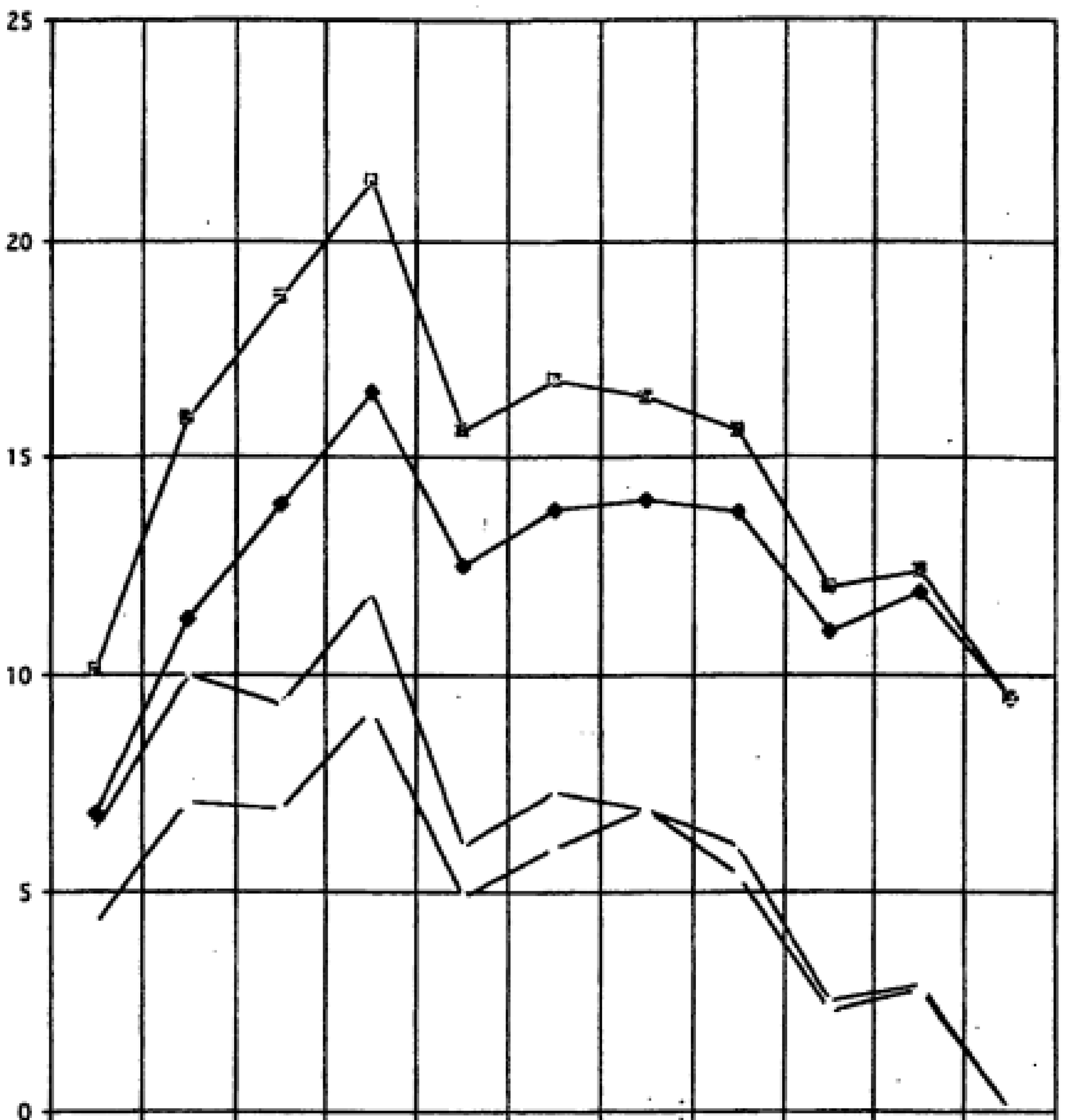
Copyright Anthony H. Cordesman, all rights reserved.

Digitized by Google

Original from
UNIVERSITY OF CALIFORNIA

Iraq's Massive Military Effort Before the Gulf War

($US Millions)



	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991
Milex ($Current)	6.8	11.3	13.9	16.5	12.5	13.8	14	13.7	11	11.9	9.5
Milex ($1991)	10.1	15.9	18.7	21.4	15.6	16.8	16.4	15.6	12	12.4	9.5
Arms Imp ($Cur)	4.3	7.1	6.9	9.2	4.9	6	6.9	5.4	2.3	2.8	0
Arms Imp ($1990)	6.4	10	9.3	11.9	6.1	7.3	6.9	6.1	2.5	2.9	0

0 = less than $50 million or nil, and all data rounded to the nearest $100 million.
Source: Richard F. Grimmett, Conventional Arms Transfers to the Developing Nations, Congressional Research Service, various editions.

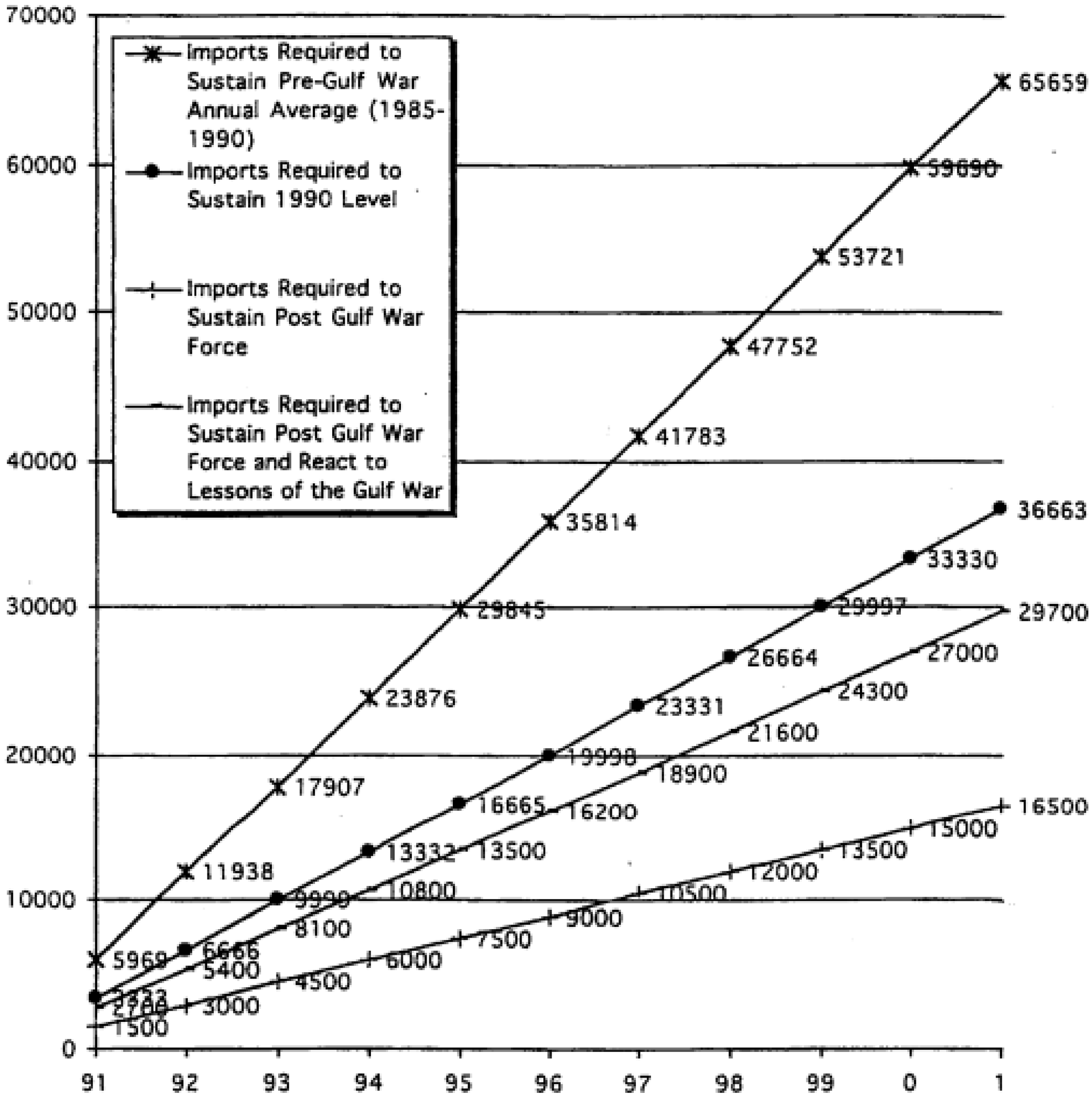
Copyright Anthony H. Cordesman, all rights reserved.

Digitized by Google

Original from
UNIVERSITY OF CALIFORNIA

The Iraqi Cumulative Arms Import Deficit Enforced by UN Sanctions

(Measured in $US 01 Constant millions)



Source: Adapted by Anthony H. Cordesman from US Arms Control and Disarmament Agency, World Military Expenditures and Arms Transfers, various editions.

Copyright Anthony H. Cordesman, all rights reserved.

Digitized by Google

Original from
UNIVERSITY OF CALIFORNIA

The Problem of Iraqi Military Production

- Iraq developed significant ammunition, small and light arms, and gun barrel production facilities before the Gulf War, and many survive and function. However, focused most resources on weapons of mass destruction.

- Left even high tech service (e.g. French and Russian aircraft) to foreign technical support teams. Did not attempt to develop major in-house capabilities.

- Pre-1991 production was heavily prototype-oriented and largely prestige-oriented in nature.

- Did import T-72 kits, in theory as transition to production facilities. However, far from clear that Iraq has industrial base for such manufactures.

- Iraqi modifications sometimes succeeded, but many failed and had an "impress the maximum leader character." E.g. T-72 upgrades.

- Historically, assembly of major weapons does not lead to technology transfer or effective reverse engineering capability without extensive foreign support. Net impact is to create over-specialized facilities, waste resources.

- No developing state, including India and China, has yet demonstrated that it can successfully mass manufacture an advanced fighter plane or tank, even on a turn-key basis.

- Few nations have made useful major equipment upgrades for armor and aircraft. Jordan and South Korea, Turkey are among few successes. Egypt, India, Pakistan are more typical.

- Iraq has effectively been cut off from all major imports of parts and specialized equipment since 1990s, although dual use items, civilian electronics and sensors, and computer gear are not effectively controlled.

- Black market imports, substitution, and local manufactures can only provide an erratic and inefficient substitute for large scale resources.

- Some indications that Iraq is giving priority to importing equipment for weapons of mass destruction.

Copyright Anthony H. Cordesman, all rights reserved.

Digitized by Google

Original from
UNIVERSITY OF CALIFORNIA

Major Iraqi Military Production Facilities

- Tank assembly plant operating under Polish and Czech licenses at Al-Amen.
- Major armor refitting center at Base West World (Samawa).
- Manufacture of proximity fuses for 155 mm and cluster munitions at April 7 (Narawan Fuse) Factory.
- Manufacture of 122 mm howitzers, Ababil rockets, tank optics and mortar sights at Sa'ad 5 (Sa'ad Engineering Complex).
- Manufacture of wheeled APCs under East European license, other armor, and artillery pieces at Al Taji).
- Manufacture and repair of artillery, vehicle parts, and cannon barrels at SEHEE heavy engineering complex (Al Dura).
- Aircraft assembly and manufacturing plant under construction at Sa'ad 38. (Fao)
- Manufacture of aerial bombs, artillery pieces, and tungsten-carbide machine tool bits at Badr (al Yusufiyah).
- Production of explosives, TNT, propellants, and some vehicle production capability at Al Hiteen (Al Iskandariyah).
- Production of cluster bombs and fuel-air explosives at Fao.
- Production of aerial bombs, TNT, and solid rocket propellants at Al Qaqaa.
- Manufacture of small naval boats at Sawary (Basra).
- Production and modification of defense electronics at Mansour (Baghdad).
- Production and modification of defense electronics, radars, and frequency-hopping radios at Sa'ad 13 (Salah al Din - Ad Dawr).
- Digital computer software, assembly of process line controllers for weapons plants, and plastic castings at Diglia (Zaafarniyah).
- Precision machining at Al Rabiyah.
- Manufacture of non-ferrous ammunition cases at Sa'ad 21 (Mosul).
- Liquid nitrogen production at Al Amil.
- Production of ethylene oxide for fuel-air explosives at PCI.
- Production of HMX and RDX explosives at Fallujah chemical plant at Al Muthanna.
- Manufacture of gas masks at Sa'ad 24 (Mosul).

Copyright Anthony H. Cordesman, all rights reserved.

Digitized by Google

Original from
UNIVERSITY OF CALIFORNIA

Copyright Anthony H. Cordesman, all rights reserved.

Digitized by Google

Original from
UNIVERSITY OF CALIFORNIA

Table of Contents

IRAQI WMD FORCE DEVELOPMENTS 1
CIA ESTIMATE OF IRAQI THREAT 3
DEPARTMENT OF DEFENSE INTELLIGENCE ESTIMATE OF IRAQI THREAT 5
Objectives, Strategies, and Resources 5
Nuclear Program 5
Biological Program 5
Chemical Program 6
Ballistic Missiles 6
Cruise Missiles and Other Means of Delivery 7
OVERVIEW OF IRAQ: NBC AND MISSILE PROGRAMS 8
Nuclear 8
Biological 8
Chemical 8
Ballistic Missiles 8
Other Means of Delivery Available 8
IRAQI COVERT BREAK OUT CAPABILITIES 9
WHAT IS AT STAKE IN TERMS OF THE UNSCOM CRISIS IN IRAQ: 10
IRAQI BALLISTIC MISSILE PROGRAM 12
IRAQI CHEMICAL WARFARE PROGRAM 13
IRAQ'S MAJOR USES OF CHEMICAL WEAPONS 1983-1988 14
IRAQI BIOLOGICAL WARFARE PROGRAM 15
IRAQ'S SEARCH FOR WEAPONS OF MASS DESTRUCTION 16

Copyright Anthony H. Cordesman, all rights reserved.

Digitized by Google

Original from
UNIVERSITY OF CALIFORNIA

Iraqi WMD Force Developments

Iraq is currently under UN sanctions that include controls on its imports and how it uses its oil revenues, and which prohibit the sale or transfer of weapons and dual-use technology to Iraq. UNSCOM dismantled much of its missile holdings and production capabilities between 1991 and 1998, as well as many of its stocks and capabilities to produce weapons of mass destruction. The US and Britain struck hard at Iraq's remaining missile production capabilities in Operation Desert Fox in December 1998.

Nevertheless, Table III.7 shows that Iraq retains significant capabilities to design and build long-range missiles, and biological and nuclear weapons. Although UNSCOM and the IAEA succeeded in destroying much of its capabilities, and virtually all of its fissile material production facilities, Iraq has managed to retain the capability to build missiles with ranges of 150 kilometers or less, and has exploited this situation to develop facilities which can rapidly be converted to the production of longer-range missiles.

The sheer complexity and persistence of the Iraqi effort described in Table III.7 is a warning of what the current regime in Iraq may do if it can ever free itself of UN sanctions. It shows that Iraq continues to try to import dual-use components that can be used in the production of nuclear weapons, and much of its biological weapons equipment has never been found. It is also important to note that Iraq has persisted in such efforts at the cost of nearly a decade of sanctions, massive economic sacrifices, and the inability to import conventional arms. Table III.7 is a history of immense costs and immense sacrifices involving a full spectrum of massive programs – facts that are generally ignored by those who focus on the human costs of sanctions while ignoring the potential cost of not maintaining them.

The National Intelligence Council summarizes the Iraqi ballistic missile threat to the US as follows:i

"Although the Gulf war and subsequent United Nations activities destroyed much of Iraq's missile infrastructure, Iraq could test an ICBM capable of reaching the United States during the next 15 years.

- After observing North Korean activities, Iraq most likely would pursue a three-stage Taepo Dong-2 approach to an ICBM (or SLV), which could deliver a several-hundred kilogram payload to parts of the United States. If Iraq could buy a Taepo Dong-2 from North Korea, it could have a launch capability within months of the purchase; if it bought Taepo Dong engines, it could test an ICBM by the middle of the next decade. Iraq probably would take until the end of the next decade to develop the system domestically.
- Although much less likely, most analysts believe that if Iraq were to begin development today, it could test a much less capable ICBM in a few years using Scud components and based on its prior SLV experience or on the Taepo Dong-1.
- If it could acquire No Dongs from North Korea, Iraq could test a more capable ICBM along the same lines within a few years of the No Dong acquisition.
- Analysts differ on the likely timing of Iraq's first flight test of an ICBM that could threaten the United States. Assessments include unlikely before 2015; and likely before 2015, possibly before 2010—foreign assistance would affect the capability and timing."

A CIA report in August 2000 summarized the state of proliferation in Iraq as follows:ii

Since Operation Desert Fox in December 1998, Baghdad has refused to allow United Nations inspectors into Iraq as required by Security Council Resolution 687. Although UN Security Council Resolution (UNSCR) 1284, adopted in December 1999, established a follow-on inspection regime to the United Nations Special Commission on Iraq (UNSCOM) in the form of the United Nations Monitoring, Verification, and Inspection Committee (UNMOVIC), there have been no UN inspections during this reporting period. Moreover, the automated video monitoring system installed by the UN at known and suspect WMD facilities in Iraq has been dismantled by the Iraqis. Having lost this on-the-ground access, it is difficult for the UN or the US to accurately assess the current state of Iraq's WMD programs.

Since the Gulf war, Iraq has rebuilt key portions of its chemical production infrastructure for industrial and commercial use, as well as its missile production facilities. It has attempted to purchase numerous dual-use items for, or under the guise of, legitimate civilian use. This equipment—in principle subject to UN scrutiny—also could be diverted for WMD purposes. Since the suspension of UN inspections in December 1998, the risk of diversion has increased.

Copyright Anthony H. Cordesman, all rights reserved.

Digitized by Google

Original from
UNIVERSITY OF CALIFORNIA

Following Desert Fox, Baghdad again instituted a reconstruction effort on those facilities destroyed by the US bombing, to include several critical missile production complexes and former dual-use CW production facilities. In addition, it appears to be installing or repairing dual-use equipment at CW-related facilities. Some of these facilities could be converted fairly quickly for production of CW agents.

UNSCOM reported to the Security Council in December 1998 that Iraq continued to withhold information related to its CW and BW programs. For example, Baghdad seized from UNSCOM inspectors an Air Force document discovered by UNSCOM that indicated that Iraq had not consumed as many CW munitions during the Iran-Iraq War in the 1980s as had been declared by Baghdad. This discrepancy indicates that Iraq may have an additional 6,000 CW munitions hidden.

We do not have any direct evidence that Iraq has used the period since Desert Fox to reconstitute its WMD programs, although given its past behavior, this type of activity must be regarded as likely. We assess that since the suspension of UN inspections in December of 1998, Baghdad has had the capability to reinitiate both its CW and BW programs within a few weeks to months, but without an inspection monitoring program, it is difficult to determine if Iraq has done so. We know, however, that Iraq has continued to work on its unmanned aerial vehicle (UAV) program, which involves converting L-29 jet trainer aircraft originally acquired from Eastern Europe. These modified and refurbished L-29s are believed to be intended for delivery of chemical or biological agents.

Iraq continues to pursue development of two SRBM systems which are not prohibited by the United Nations: the liquid-propellant Al-Samoud, and the solid-propellant Ababil-100. The Al-Samoud is essentially a scaled-down Scud, and the program allows Baghdad to develop technological improvements that could be applied to a longer range missile program. We believe that the Al-Samoud missile, as designed, is capable of exceeding the UN-permitted 150-km-range restriction with a potential operational range of about 180 kilometers. Personnel previously involved with the Condor II/Badr-2000 missile—which was largely destroyed during the Gulf war and eliminated by UNSCOM—are working on the Ababil-100 program. If economic sanctions against Iraq were lifted, Baghdad probably would attempt to convert these efforts into longer range missile systems, regardless of continuing UN monitoring and continuing restrictions on WMD and long-range missile programs.

Once again, there is no way to determine whether Iraq will actually create such capabilities to strike the US. It does seems likely, however, that if Saddam Hussein or his immediate coterie remain in power that Iraqi will be an aggressive and revanchist state. This could take the form of an effort to create a missile threat to the US. Any Iraqi leadership with ambitions to seize the territory of another power in the region might conclude that Iraq would need a credible deterrent capability to strike the US in order to prevent the US from using its forces to halt Iraqi military action.

The sheer scale and complexity of the past Iraqi efforts shown in Table III.7 is a warning that Iraq is perfectly capable of acting in such a manner. At the same time, it is far from clear that a future Iraqi leadership will have the ambitions and attitudes of Saddam Hussein. Even a relatively hostile leadership might conclude that deploying ICBMs to strike the US would be so provocative that the US might preempt – as it did in striking Iraqi missile production facilities in December 1999 during operation Desert Fox. Such a regime might conclude that creating a regional capability to strike with missiles and weapons of mass destruction would hold the allies, power projection forces, and bases of the US as hostages without triggering the kind of reaction the US might make to a direct threat to its Homeland. Given the other major proliferators in the region -- which include India, Iran, Israel, Pakistan, and Syria – even a regime that is not actively hostile to the US might continue to develop nuclear weapons and long-range missiles in spite of its agreements not to do so.

At the same time, there is no way to predict that Iraq will pose such a threat, or the size, timing, and effectiveness, of any forces it may deploy. Iraq presents the same dilemma for NMD planning purposes as North Korea and Iran. There is no way that the justification for an NMD system can be built around the certainty of an Iraqi threat or tailored to some clear concept of what that threat will be. There equally is no way that the need for an NMD system can be dismissed because of the lack of a valid potential threat.

Copyright Anthony H. Cordesman, all rights reserved.

Digitized by Google

Original from
UNIVERSITY OF CALIFORNIA

CIA Estimate of Iraqi Threat

In Iraq Saddam Hussein has grown more confident in his ability to hold on to his power. He maintains a tight handle on internal unrest, despite the erosion of his overall military capabilities. Saddam's confidence has been buoyed by his success in quieting the Shia insurgency in the south, which last year had reached a level unprecedented since the domestic uprising in 1991. Through brutal suppression, Saddam's multilayered security apparatus has continued to enforce his authority and cultivate a domestic image of invincibility.

High oil prices and Saddam's use of the oil-for-food program have helped him manage domestic pressure. The program has helped meet the basic food and medicine needs of the population. High oil prices buttressed by substantial illicit oil revenues have helped Saddam ensure the loyalty of the regime's security apparatus operating and the few thousand politically important tribal and family groups loyal.

There are still constraints on Saddam's power. His economic infrastructure is in long-term decline, and his ability to project power outside Iraq's borders is severely limited, largely because of the effectiveness and enforcement of the No-Fly Zones. His military is roughly half the size it was during the Gulf War and remains under a tight arms embargo. He has trouble efficiently moving forces and supplies—a direct result of sanctions. These difficulties were demonstrated most recently by his deployment of troops to western Iraq last fall, which were hindered by a shortage of spare parts and transport capability.

Despite these problems, we are likely to see greater assertiveness—largely on the diplomatic front—over the next year. Saddam already senses improved prospects for better relations with other Arab states. One of his key goals is to sidestep the 10-year-old economic sanctions regime by making violations a routine occurrence for which he pays no penalty.

Saddam has had some success in ending Iraq's international isolation. Since August, nearly 40 aircraft have flown to Baghdad without obtaining UN approval, further widening fissures in the UN air embargo. Moreover, several countries have begun to upgrade their diplomatic relations with Iraq. The number of Iraqi diplomatic missions abroad are approaching pre-Gulf War levels, and among the states of the Gulf Cooperation Council, only Kuwait and Saudi Arabia have not reestablished ties.

Our most serious concern with Saddam Hussein must be the likelihood that he will seek a renewed WMD capability both for credibility and because every other strong regime in the region either has it or is pursuing it. For example, the Iraqis have rebuilt key portions of their chemical production infrastructure for industrial and commercial use. The plants he is rebuilding were used to make chemical weapons precursors before the Gulf War and their capacity exceeds Iraq's needs to satisfy its civilian requirements

We have similar concerns about other dual-use research, development, and production in the biological weapons and ballistic missile fields; indeed, Saddam has rebuilt several critical missile production complexes.

Adapted from Statement by Director of Central Intelligence, George J. Tenet before the Senate Select Committee on Intelligence on the "Worldwide Threat 2001: National Security in a Changing World" (as prepared for delivery) 07 February 2001

Since Operation Desert Fox in December 1998, Baghdad has refused to allow United Nations inspectors into Iraq as required by Security Council Resolution 687. In spite of ongoing UN efforts to establish a follow-on inspection regime comprising the UN Monitoring, Verification, and Inspection Commission (UNMOVIC) and the IAEA's Iraq Action Team, no UN inspections occurred during this reporting period. Moreover, the automated video monitoring system installed by the UN at known and suspect WMD facilities in Iraq is no longer operating. Having lost this on-the-ground access, it is more difficult for the UN or the US to accurately assess the current state of Iraq's WMD programs.

Given Iraq's past behavior, it is likely that Iraq has used the period since Desert Fox to reconstitute prohibited programs. We assess that since the suspension of UN inspections in December of 1998, Baghdad has had the capability to reinitiate both its CW and BW programs within a few weeks to months. Without an inspection-monitoring program, however, it is more difficult to determine if Iraq has done so.
Since the Gulf war, Iraq has rebuilt key portions of its chemical production infrastructure for industrial and commercial use, as well as its missile production facilities. It has attempted to purchase numerous dual-use items for, or under the guise of, legitimate civilian use. This equipment—in principle subject to UN scrutiny—also could

Copyright Anthony H. Cordesman, all rights reserved.

Digitized by Google

Original from
UNIVERSITY OF CALIFORNIA

be diverted for WMD purposes. Since the suspension of UN inspections in December 1998, the risk of diversion has increased. After Desert Fox, Baghdad again instituted a reconstruction effort on those facilities destroyed by the US bombing, including several critical missile production complexes and former dual-use CW production facilities. In addition, Iraq appears to be installing or repairing dual-use equipment at CW-related facilities. Some of these facilities could be converted fairly quickly for production of CW agents.

UNSCOM reported to the Security Council in December 1998 that Iraq also continued to withhold information related to its CW program. For example, Baghdad seized from UNSCOM inspectors an Air Force document discovered by UNSCOM that indicated that Iraq had not consumed as many CW munitions during the Iran-Iraq war in the 1980s as had been declared by Baghdad. This discrepancy indicates that Iraq may have hidden an additional 6,000 CW munitions.

In 1995, Iraq admitted to having an offensive BW program and submitted the first in a series of Full, Final, and Complete Disclosures (FFCDs) that were supposed to reveal the full scope of its BW program. According to UNSCOM, these disclosures are incomplete and filled with inaccuracies. Since the full scope and nature of Iraq's BW program was not verified, UNSCOM had assessed that Iraq continued to maintain a knowledge base and industrial infrastructure that could be used to produce quickly a large amount of BW agents at any time, if the decision is made to do so. In the absence of UNSCOM or other inspections and monitoring since late 1998, we remain concerned that Iraq may again be producing biological warfare agents.

Iraq has continued working on its L-29 unmanned aerial vehicle (UAV) program, which involves converting L-29 jet trainer aircraft originally acquired from Eastern Europe. It is believed that Iraq has conducted flights of the L-29, possibly to test system improvements or to train new pilots. These refurbished trainer aircraft are believed to have been modified for delivery of chemical or, more likely, biological warfare agents.

We believe that Iraq has probably continued low-level theoretical R&D associated with its nuclear program. A sufficient source of fissile material remains Iraq's most significant obstacle to being able to produce a nuclear weapon. Although we were already concerned about a reconstituted nuclear weapons program, our concerns were increased last September when Saddam publicly exhorted his "Nuclear Mujahidin" to "defeat the enemy."

Iraq continues to pursue development of SRBM systems that are not prohibited by the United Nations and may be expanding to longer-range systems. Pursuit of UN-permitted missiles continues to allow Baghdad to develop technological improvements and infrastructure that could be applied to a longer-range missile program. We believe that development of the liquid-propellant Al-Samoud SRBM probably is maturing and that a low-level operational capability could be achieved in the near term — which is further suggested by the appearance of four Al Samoud transporter-erector-launchers (TELs) with airframes at the 31 December Al Aqsa Cal parade.

The solid-propellant missile development program may now be receiving a higher priority, and development of the Ababil-100 SRBM – two of such airframes and TELs were paraded on 31 December—and possibly longer range systems may be moving ahead rapidly. If economic sanctions against Iraq were lifted, Baghdad probably would increase its attempts to acquire missile-related items from foreign sources, regardless of any future UN monitoring and continuing restrictions on long-range ballistic missile programs. Iraq probably retains a small, covert force of Scud-type missiles.

Iraq's ACW acquisitions remain low due to the generally successful enforcement of the UN arms embargo. The weapons and ACW-related goods which have been delivered to Iraq tend to be smaller arms transported over porous land borders. Iraq continues, however, to aggressively seek ACW equipment and technology.

Adapted from Statement by Director of Central Intelligence, George J. Tenet, Unclassified Report to Congress on the Acquisition of Technology Relating to Weapons of Mass Destruction and Advanced Conventional Munitions, 1 July Through 31 December 2000, Report of September 2001.

Copyright Anthony H. Cordesman, all rights reserved.

Digitized by Google

Original from
UNIVERSITY OF CALIFORNIA

Department of Defense Intelligence Estimate of Iraqi Threat

Objectives, Strategies, and Resources

Iraq believes NBC weapons and ballistic missiles are necessary if it is to reach its goal of being the dominant power in the region. Since the end of the Gulf War, Baghdad steadfastly resisted the terms of the cease-fire agreement, which required it to cooperate with the United Nations Special Commission (UNSCOM) and the IAEA in identifying and eliminating Iraq's NBC and theater ballistic missile capabilities. Iraq's policy of deception and denial sparked numerous confrontations with UNSCOM and the IAEA over the years and culminated with the allied bombing of Iraq under Operation Desert Fox in December 1998.

Since late 1998, Baghdad has refused to allow UN inspectors into Iraq as required by UN Security Council Resolutions (UNSCRs) 687, 707, 715 and 1284. (UNSCR 1284, adopted in December 1999, established a follow-on regime to UNSCOM called the United Nations Monitoring, Verification and Inspection Commission [UNMOVIC]). As a result, there have been no UN inspections for over two years, and the automated monitoring systems installed by the UN at known and suspected Iraqi NBC and missile facilities are no longer operational. This abeyance of on-site

inspections and our previous judgments about Iraqi intentions raise concerns that Iraq may have begun such reconstitution efforts and that it will again be able to threaten its neighbors. In support of these rebuilding efforts, Iraq is known to have attempted to purchase numerous dual-use items under the guise of legitimate civil use since the end of the Gulf War.

Iraq remains largely a petroleum-based economy. Prior to the 1990 Iraqi invasion of Kuwait, Iraq's petroleum sector accounted for 61 percent of its GDP and about $14.5 billion in exports; per capita GDP was $2,270. UN sanctions subsequently were imposed on Iraq, and since then there has been a significant decline in Iraqi economic output. Increased illegal petroleum product exports since 1996 and crude oil exports allowed by the UN since 1997 have led to significant growth in the industrial and petroleum sectors since 1996. However, under UNSCR 1284, Iraq can export any volume of petroleum for humanitarian needs. Nonetheless, inflation fluctuates wildly depending on supply and demand, the political situation, and regime market manipulation; inflation estimates range from 90 to almost 300 percent. While oil exports are still a dominant economic force in Iraq, Iraqi per cap-ita GDP was reported to have dropped to $587 by 1999. Despite these severe pressures on its economy, Saddam Hussein's government continues to devote Iraqi resources to rebuilding certain portions of its NBC weapons and missile infrastructure.

Nuclear Program

Iraq has ratified the NPT. Nevertheless, before the Gulf War, Iraq had a comprehensive nuclear weapons development program that was focused on building an implosion-type device. The program was linked to a ballistic missile project that was the intended delivery system. From April 1991 to December 1998, Iraqi nuclear aspirations were held in check by IAEA/ UNSCOM inspections and monitoring. All known weapons-grade fissile material was removed from the country. Although Iraq claims that it destroyed all of the specific equipment and facilities useful for developing nuclear weapons, it still retains sufficient skilled and experienced scientists and engineers as well as weapons design information that could allow it to restart a weapons program.

Iraq would need five or more years and key foreign assistance to rebuild the infrastructure to enrich enough material for a nuclear weapon. This period would be substantially shortened should Baghdad successfully acquire fissile material from a foreign source.

Biological Program

Iraq's continued refusal to disclose fully the extent of its biological program suggests that Baghdad retains a biological warfare capability, despite its membership in the BWC. After four and one-half years of claiming that it had conducted only "defensive research" on biological weapons Iraq declared reluctantly, in 1995, that it had produced approximately 30,000 liters of bulk biological agents and/or filled munitions. Iraq admitted that it produced anthrax, botulinum toxins and aflatoxins and that it prepared biological agent-filled munitions, including missile warheads and aerial bombs. However, UNSCOM believed that Iraq had produced substantially greater amounts than it has admitted –three to four times greater. Iraq also admitted that, during the Persian Gulf War, it had deployed biological agent-filled munitions to air-fields and that these weapons were intended for use against

Copyright Anthony H. Cordesman, all rights reserved.

Digitized by Google

Original from
UNIVERSITY OF CALIFORNIA

Israel and coalition forces in Saudi Arabia. Iraq stated that it destroyed all of these agents and munitions in 1991, but it has provided insufficient credible evidence to support this claim.

The UN believes that Baghdad has the ability to reconstitute its biological warfare capabilities within a few weeks or months, and, in the absence of UNSCOM inspections and monitoring during 1999 and 2000, we are concerned that Baghdad again may have produced some biological warfare agents.

Chemical Program

Since the Gulf War, Baghdad has rebuilt key portions of its industrial and chemical production infrastructure; it has not become a state party to the CWC. Some of Iraq's facilities could be converted fairly quickly to production of chemical warfare agents. Following Operation Desert Fox, Baghdad again instituted a rapid reconstruction effort on those facilities to

include former dual-use chemical warfare-associated production facilities, destroyed by U.S. bombing. In 1999, Iraq may have begun installing or repairing dual-use equipment at these and other chemical war-fare-related facilities. Previously, Iraq was known to have produced and stockpiled mustard, tabun, sarin, and VX, some of which likely remain hidden. It is likely that an additional quantity of various precursor chemicals also remains hidden.

In late 1998, UNSCOM reported to the UN Security Council that Iraq continued to withhold information related to its chemical program. UNSCOM cited an example where Baghdad seized from inspectors a document discovered by UNSCOM inspectors, which indicated that Iraq had not consumed as many chem-cal munitions during the Iran-Iraq War as had been declared previously by Baghdad. This document suggests that Iraq may have an additional 6,000 chemical munitions hidden. Similarly, UNSCOM discovery in 1998 of evidence of VX in Iraqi missile warheads showed that Iraq had lied to the international community for seven years when it repeatedly said that it had never weaponized VX.

Iraq retains the expertise, once a decision is made, to resume chemical agent production within a few weeks or months, depending on the type of agent. However, foreign assistance, whether commercial procurement of dual-use technology, key infrastructure, or other aid, will be necessary to completely restore Iraq's chemical agent production capabilities to pre-Desert Storm levels. Iraqi doctrine for the use of chemical weapons evolved during the Iran-Iraq War, and was fully incorporated into Iraqi offensive operations by the end of the war in 1988. During different stages of that war, Iraq used aerial bombs, artillery, rocket launchers, tactical rockets, and sprayers mounted in helicopters to deliver agents against Iranian forces. It also used chemical agents against Kurdish elements of its own civilian population in 1988.

Ballistic Missiles

Iraq likely retains a limited number of launchers and SCUD-variant SRBMs capable of striking its neighbors, as well as the components and manufacturing means to assemble and produce others, anticipating the reestablishment of a long-range ballistic missile force sometime in the future. Baghdad likely also has warheads capable of delivering chemical or biological agents. While Iraq's missile production infrastructure was damaged during the December 1998 strikes, Iraq retains domestic expertise and sufficient infrastructure to support most missile component production, with the exception of a few critical subelements.

During 1999, Iraq continued to work on the two short-range ballistic missile systems that fall within the 150-kilometer range restriction imposed by the UN: the liquid-propellant Al Samoud and the solid-propellant Ababil-100. The Al-Samoud is essentially a scaled-down SCUD, and work on it allows Baghdad to develop technological capabilities that could be applied to a longer-range missile program. We believe that the Al Samoud missile, as designed by the Iraqis, has an inherent potential to exceed the 150-kilometers range restriction imposed under UNSCR 687. Iraqi personnel involved with pre-Desert Storm ballistic missile efforts are working on the Ababil-100 SRBM program.

Once economic sanctions against Iraq are lifted, unless restricted by future UN monitoring, Baghdad probably will begin converting these efforts into longer-range missile systems. Despite the damage done to Iraq's missile infrastructure during the Gulf War, Desert Fox, and subsequent UNSCOM activities, Iraq may have ambitions for longer-range missiles, including an ICBM. Depending on the success of acquisition efforts and degree of foreign support, it is possible that Iraq could develop and test an ICBM capable of reaching the United States by 2015.

Copyright Anthony H. Cordesman, all rights reserved.

Digitized by Google

Original from
UNIVERSITY OF CALIFORNIA

Cruise Missiles and Other Means of Delivery

Iraq may have a very limited stockpile of land-launched short-range anti-ship cruise missiles and air-launched short-range tactical missiles that it purchased from China and France prior to the Gulf War.

These are potential means of delivery for NBC weapons. Iraq also has a variety of fighter aircraft, helicopters, artillery, and rockets available as potential means of delivery for NBC weapons, although their operational status is questionable due to the cumulative effects of the UN arms embargo. However, Iraq has continued to work on its UAV program, which involves converting L-29 jet trainer aircraft originally acquired from Eastern Europe. These modified and refurbished L-29s may be intended for the delivery of chemical or biological agents. In the future, Iraq may try to use its research and development infrastructure to produce its own UAVs and cruise missiles or, should the UN arms embargo be lifted, it could try to purchase cruise missiles.

Source: Adapted by Anthony H. Cordesman from Secretary of Defense William S. Cohen, Proliferation: Threat and Response, Washington DC, Department of Defense, January 2001

Copyright Anthony H. Cordesman, all rights reserved.

Digitized by Google

Original from
UNIVERSITY OF CALIFORNIA

Overview of Iraq: NBC and Missile Programs

Nuclear

- Had comprehensive nuclear weapons development program prior to Operation Desert Storm. Infrastructure suffered considerable damage from Coalition bombing and IAEA dismantlement.
- Retains scientists, engineers, and nuclear weapons design information; without fissile material, would need five or more years and significant foreign assistance to rebuild program and produce nuclear devices; less time would
- be needed if sufficient fissile material were acquired illicitly.
- Ratified the NPT; has not signed the CTBT.

Biological

- Produced and weaponized significant quantities of biological warfare agents prior to Desert Storm.
- Admitted biological warfare effort in 1995, after four years of denial; claimed to have destroyed all agents, but
- offered no credible proof.
- May have begun program reconstitution in absence of UN inspections and monitoring.
- Acceded to the BWC.

Chemical

- Rebuilt some of its chemical production infrastructure allegedly for commercial use.
- UNSCOM discovered evidence of VX persistent nerve agent in missile warheads in 1998, despite Iraqi denials for
- seven years that it had not weaponized VX.
- May have begun program reconstitution in absence of UN inspections and monitoring.
- Has not signed the CWC.

Ballistic Missiles

- Probably retains limited number of SCUD-variant missiles, launchers, and warheads capable of delivering
- biological and chemical agents. Retains significant missile production capability.
- Continues work on liquid- and solid-propellant SRBMs (150 kilometers) allowed by UNSCR 687; likely will use
- technical experience gained for future longer range missile development effort.
- Not a member of the MTCR.

Other Means of Delivery Available

- Land-launched anti-ship cruise missiles; air-launched tactical missiles; none have NBC warheads; stockpile likely
- is very limited.
- Air systems: fighters, helicopters, UAVs.
- Ground systems: artillery, rockets.

Copyright Anthony H. Cordesman, all rights reserved.

Digitized by Google

Original from
UNIVERSITY OF CALIFORNIA

Iraqi Covert Break Out Capabilities

- UNSCOM and the IAEA's success have created new priorities for Iraqi proliferation. The UN's success in destroying the large facilities Iraq needs to produce fissile materials already may well have led Iraq to focus on covert cell-like activities to manufacture highly lethal biological weapons as a substitute for nuclear weapons.
- All of the biological agents Iraq had at the time of the Gulf War seem to have been "wet" agents with limited storage life and limited operational lethality. Iraq may have clandestinely carried out all of the research necessarily to develop a production capability for dry, storage micro-power weapons which would be far easier to clandestinely stockpile, and have much more operational lethality.
- Iraq did not have advanced binary chemical weapons and most of its chemical weapons used unstable ingredients. Iraq has illegally imported specialized glassware since the Gulf War, and may well have developed advanced binary weapons and tested them in small numbers. It may be able to use a wider range of precursors and have developed plans to produce precursors in Iraq. It may have improved its technology for the production of VX gas.
- Iraq is likely to covertly exploit Western analyses and critiques of its pre-war proliferation efforts to correct many of the problems in the organization of its proliferation efforts, its weapons design, and its organization for their use.
- Iraq bombs and warheads were relatively crude designs which did not store chemical and biological agents well and which did a poor job of dispersing them. Fusing and detonation systems did a poor job of ensuring detonation at the right height and Iraq made little use of remote sensors and weather models for long-range targeting and strike planning. Iraq could clandestinely design and test greatly improve shells, bombs, and warheads. The key tests could be conducted using towers, simulated agents, and even indoors. Improved targeting, weather sensors, and other aids to strike planning are dual-use or civil technologies that are not controlled by UNSCOM. The net impact would weapons that could be 5-10 times more effective than the relatively crude designs Iraq had rushed into service under the pressure of the Iran-Iraq War.
- UNSCOM and the IAEA's success give Iraq an equally high priority to explore ways of obtaining fissile material from the FSU or other potential supplier country and prepare for a major purchase effort the moment sanctions and inspections are lifted and Iraq has the hard currency to buy its way into the nuclear club. Iraq could probably clandestinely assemble all of the components of a large nuclear device except the fissile material, hoping to find some illegal source of such material.
- The components for cruise missiles are becoming steadily more available on the commercial market, and Iraq has every incentive to create a covert program to examine the possibility of manufacturing or assembling cruise missiles in Iraq.
- UN inspections and sanctions may also drive Iraq to adopt new delivery methods ranging from clandestine delivery and the use of proxies to sheltered launch-on-warning capabilities designed to counter the US advantage in airpower.
- Iraq can legally maintain and test missiles with ranges up to 150 kilometers. This allows for exoatmospheric reentry testing and some testing of improved guidance systems. Computer simulation, wind tunnel models, and production engineering tests can all be carried out clandestinely under the present inspection regime. It is possible that Iraq could develop dummy or operational high explosive warheads with shapes and weight distribution of a kind that would allow it to test concepts for improving its warheads for weapons of mass destruction. The testing of improved bombs using simulated agents would be almost impossible to detect as would the testing of improved spray systems for biological warfare.
- Iraq has had half a decade in which to improve its decoys, dispersal concepts, dedicated command and control links, targeting methods, and strike plans. This kind of passive warfare planning is impossible to forbid and monitor, but ultimately is as important and lethal as any improvement in hardware.
- There is no evidence that Iraq made an effort to develop specialized chemical and biological devices for covert operations, proxy warfare, or terrorist use. It would be simple to do so clandestinely and they would be simple to manufacture.

Copyright Anthony H. Cordesman, all rights reserved.

Digitized by Google

Original from
UNIVERSITY OF CALIFORNIA

What is At Stake in Terms of the UNSCOM Crisis in Iraq:

Summary of the Iraqi Threat Reported in the Note by the Secretary General, "Report of the Secretary-General on the Activities of the Special Commission," S/1997/774, October 6, 1997

- Analysis had shown that Iraq had destroyed 83 of the 85 missiles it had claimed were destroyed. at the same time, it stated that Iraq had not given an adequate account of its proscribed missile assets, including launchers, warheads, and propellants. It also stated that Tariq Aziz, Iraq's Deputy Prime Minister, "gave an explicit order in the presence of the Executive Chairman, to the Iraqi experts not to discuss such issues with the Chairman."

- Iraq had continued to lie regarding the way in which it has destroyed its pre-war inventory of missile launchers, and major uncertainties remained over its holdings of biological and chemical missile warheads. Iraq initially claimed that it had 45 missile warheads filled with chemical weapons in 1992. It then stated that it had 20 chemical and 25 biological warheads in 1995. UNSCOM established that it had a minimum of 75 operational warheads and 5 used for trials. It has evidence of the existence of additional warheads. It can only verify that 16 warheads were filled with Sarin, and 34 with chemical warfare binary components, and that 30 were destroyed under its supervision -- 16 with Sarin and 14 with binary components. Iraq again failed to provide documentation on this issue in September, 1997.

- It continued to conceal documents describing its missile propellants, and the material evidence relating to its claims to have destroyed its indigenous missile production capabilities indicated in might has destroyed less than a tenth of what it claimed.

- "The Commission identified some other areas of concern related to Iraq's chemical weapons program. The most important among them are the accounting for special missile warheads intended for filling with chemical or biological warfare agent, the material balance of some 550 155 mm mustard gas shells, the extent of VX programs, and the rationale for the acquisition of various types of chemical weapons."

- UNSCOM stated that it had been able to destroy 120 pieces of additional equipment for the production of chemical weapons that Iraq had only disclosed in August, 1997. Major uncertainties still existed regarding some 4,000 tons of declared precursors for chemical weapons, the production of several hundred tons of additional chemical warfare agents, the consumption of chemical precursors, and Iraq's claims to have unilaterally destroyed some 130 tons of chemical warfare agents. Major uncertainties existing regarding 107,500 empty casings for chemical weapons, whether several thousand additional chemical weapons were filled with agents, the unilateral destruction of 15, 620 weapons, and the fate of 16,038 additional weapons Iraq claimed it had discarded. "The margin of error" in the accounting presented by Iraq is in the neighborhood of 200 munitions."

- The uncertainties affecting the destruction of VX gas affect some 750 tons of imported precursor chemicals, and 55 tons of domestically produced precursors. Iraq has made unverifiable claims that 460 tons were destroyed by Coalition air attacks, and that it unilaterally destroyed 212 tons. UNSCOM has only been able to verify the destruction of 155 tons out of this latter total, and destroy a further 36 tons on its own. Iraq systematically lied about the existence of its production facilities for VX gas until 1995, and made "significant efforts" to conceal its production capabilities after that date.

- "Iraq has not provided physical evidence (relating to) binary artillery munitions and aerial bombs, chemical warheads for short range missiles, cluster aerial bombs, and spray tanks." Iraq has claimed these were only prototype programs, but there is no current way to know how many were deployed as weapons.

- "Until July, 1995, Iraq totally denied it had any offensive biological warfare program. Since then, Iraq has presented three versions of FFCDs and four "drafts." The most recent FFCD was presented by Iraq on 11 September 1997. This latest submission followed the Commission's rejection, in April 1997, of the previous FFCD of June 1996...In the period since that report, the Commission conducted eight inspections in an attempt to investigate critical areas of Iraq's proscribed activities such as warfare agent production and destruction, biological munitions manufacturing, filling and destruction, and military involvement in and support to the proscribed program. Those investigations, along with documents and other evidence available to the Commission, confirmed the assessment that the June 1996 declaration was deeply deficient....The new FFCD, received on 11 September 1997, contains fewer errata and is more coherent. However, with regard to the important issues...the report contains no significant changes from the June 1996 FFCD. ..the Commission's

Copyright Anthony H. Cordesman, all rights reserved.

Digitized by Google

Original from
UNIVERSITY OF CALIFORNIA

questions are rephrased to in order to avoid having to produce direct answers, or are answer incompletely, or are ignored completely...Little of the information the Commission has gathered since June 1996 has been incorporated into the new document."

- Iraq has never provided a clear picture of the role of its military in its biological warfare program, and has claimed it only played a token role. It has never accounted for its disposal of growth media. "Media unaccounted for is sufficient, in quantity, for the production of over three times more of the biological agent -- Anthrax -- stated by Iraq to have been produced...Bulk warfare agent production appears to be vastly understated by Iraq...Experts calculations of possible agent production quantities, either by equipment capacity or growth media amounts, far exceed Iraq's stated results....Significant periods when the fermenters were claimed not to be utilized are unexplained."

- Iraq's accounting for its Aflatoxin production is not credible. Biological warfare field trials are underreported and inadequately described. Claims regarding field trials of chemical and biological weapons using R400 bombs are contradictory and indicate that, "more munitions were destroyed than were produced." No documentation has been provided on munitions filling. The account of Iraq's unilateral destruction of bulk biological agents is "incompatible with the facts...The Commission is unable to verify that the unilateral destruction of the BW-filled Al Hussein warheads has taken place."

- There is no way to confirm whether Iraq destroyed 157 bombs of the R400 type, some of which were filled with Botulin or anthrax spores.

- "The September 1997 FFCD fails to give a remotely credible account of Iraq's biological program. This opinion has been endorsed by an international panel of experts."

Copyright Anthony H. Cordesman, all rights reserved.

Digitized by Google

Original from
UNIVERSITY OF CALIFORNIA

Iraqi Ballistic Missile Program

Item	Initial Inventory	Comments
Soviet supplied Scud Missiles (includes Iraqi Modifications of the Al-Husayn with a range of 650 km and the Al-Abbas with a range of 950 km)	819	UNSCOM accepts Iraqi accounting for all but two of the original 819 Scud missiles acquired from the Soviet Union. Iraq hasn't explained the disposition of major components that it may have stripped from operational missiles before their destruction, and some Iraqi claims-- such as the use of 14 Scuds in ATBM tests- are not believable. Gaps in Iraqi declarations and Baghdad's failure to fully account for indigenous missile programs strongly suggest that Iraq retains a small missile force.
Iraqi-Produced Scud Missiles	Unknown	Iraq denied producing a completed Scud missile, but it produced/procured and tested all major subcomponents.
Iraqi-Produced Scud Warheads	120	Iraq claims all 120 were used or destroyed. UNSCOM supervised the destruction of 15. Recent UNSCOM inspections found additional CW/BW warheads beyond those currently admitted.
Iraqi-Produced Scud Airframes	2	Iraq claims testing 2 indigenous airframes in 1990. It is unlikely that Iraq produced only 2 Scud airframes.
Iraqi-Produced Scud Engines	80	Iraq's claim that it melted 63 engines following acceptance tests--53 of which failed quality controls-- are unverifiable and not believable. UNSCOM is holding this as an open issue.
Soviet-Supplied Missile Launchers	11	UNSCOM doubts Iraq's claim that it unilaterally destroyed 5 launchers. The Soviet Union may have sold more than the declared 11 launchers.
Iraqi-Produced Missile Launchers	8	Iraq has the capability to produce additional launchers.

Adapted by Anthony H. Cordesman from material provided by the NSC on February 19, 1998.

Copyright Anthony H. Cordesman, all rights reserved.

Digitized by Google

Original from
UNIVERSITY OF CALIFORNIA

Iraqi Chemical Warfare Program

CW Agent Stockpiles (In Metric tons)

CW Agent	Chemical Agents Declared by Iraq	Potential CW Agents based on Unaccounted Precursors [1,2]	Comments
VX	At least 4	200	Iraq denied producing VX until Husayn Kamil's defection in 1995
G-agents (Sarin)	100-150	200	Figures include both weaponized and bulk agents
Mustard	500-600	200	Figures include both weaponized and bulk agents.

CW Delivery Systems (In Numbers of Weapons Systems)

Delivery System	Estimated Numbers Before the Gulf War	Munitions Unaccounted for [1,2]	Comments
Missile Warheads Al-Husayn (Modified Scud B)	75-100	45-70	UNSCOM supervised the destruction of 30 warheads
Rockets	100,000	15,000-25,000 bombs)	UNSCOM supervised the destruction of 28,000 of which were fired.
Aerial bombs	16,000	2,000	
Artillery Shells	30,000	15,000	
Aerial Spray Tanks	Unknown	Unknown	

1.) These estimates are very rough. They are derived from reports provided by UNSCOM to the Security Council and to UNSCOM plenary meetings. Gaps in Iraqi disclosures strongly suggest that Baghdad is concealing chemical munitions and precursors. Iraq may also retain a small stockpile of filled munitions. Baghdad has the capability to quickly resume CW production at known duel-use facilities that currently produce legitimate items, such as pharmaceuticals and pesticides. UNSCOM has supervised the destruction of some 45 different types of CW precursors (1,800,000 liters of liquid and 1,000,000 kg of solid).

2.) All these munitions could be used to deliver CW or BW agents. The numbers for missile warheads include 25 that Iraq claims to have unilaterally destroyed after having filled them with biological agents during the Gulf war. UNSCOM has been unable to verify the destruction of these warheads.

Adapted by Anthony H. Cordesman from material provided by the NSC on February 19, 1998.

Copyright Anthony H. Cordesman, all rights reserved.

Digitized by Google

Original from
UNIVERSITY OF CALIFORNIA

Iraq's Major Uses of Chemical Weapons 1983-1988

Date	Area	Type of Gas	Approximate Casualties	Target
August 1983	Haij Umran	Mustard	Less than 100	Iranians/Kurds
October-November 1983	Panjwin	Mustard	3,0000	Iranians/Kurds
February-March 1984	Majnoon Island	Mustard	2,500	Iranians
March 1984	Al Basrah	Tabun	50- 100	Iranians
March 1985	Hawizah Marsh	Mustard/Tabun	3,000	Iranians
February 1996	Al Faw	Mustard/Tabun	8,000-10,000	Iranians
December 1986	Umm ar Rasas	Mustard	1,000s	Iranians
April 1987	Al Basrah	Mustard/Tabun	5,000	Iranians
October 1987	Sumar/Mehran	Mustard/Nerve Agents	3,000	Iranians
March 1988	Halabjah	Mustard/Nerve Agents	Hundreds	Iranians/Kurds

Note: Iranians also used poison gas at Halabjah and may have caused some of the casualties.

Source: Adapted from material provided by the NSC on February 19, 1998.

Copyright Anthony H. Cordesman, all rights reserved.

Digitized by Google

Original from
UNIVERSITY OF CALIFORNIA

Iraqi Biological Warfare Program

BW Agent Production Amounts

BW Agent	Declared Concentrated Amounts	Declared Total Amounts	Comments
Anthrax (Bacillusanthracis)	8,500 liters (2,245 gallons)	85,000 liters (22,557 gallons)	UNSCOM estimates production amounts were actually 3-4 times more than the declared amounts, but is unable to confirm.
Botulinum toxin (Clostridium Botulinum)	19,400 liters (10x and 20x concentrated) (5,125 gallons)	380,000 liters (100,396 gallons)	UNSCOM estimates production amounts Were actually 2 times more than the Declared amounts, but is unable to confirm.
Gas Gangrene (Clostridium perfringens)	340 liters (90 gallons)	3,400 liters (900 gallons)	Production amounts could be higher, but UNSCOM is unable to confirm.
Aflatoxin (Aspergillus flavus and Aspergillus parasiticus)	N/A	2,200 liters (581 gallons)	Production amounts and time frame of production claimed by Iraq do not correlate.
Ricin (Castor Bean plant)	N/A	10 liters (2.7 gallons)	Production amounts could be higher, but UNSCOM is unable to confirm.

BW-Filled and Deployed Delivery Systems

Delivery System	Anthrax	Botulinum Toxin	Aflatoxin	Comments
Missile warheads Al-Husayn (modified Scud B)	5	16	4	UNSCOM cannot confirm the unilateral Destruction of these 25 warheads due to conflicting accounts provided by Iraq.
R-400 aerial bombs	50	100	7	Iraq claimed unilateral destruction of 157 Bombs, but UNSCOM is unable to confirm this number. UNSCOM has found the remains of at least 23.
Aircraft aerosol spray tanks may F-1 Mirage modified fuel drop tank	4			Iraq claims to have produced 4, but Have manufactured others.

BW Agent Growth Media

Media	Quantity Imported	Unaccounted For Amounts
BW Agent Growth Media	31,000 kg (68,200 lbs.)	3,500 kg (7,700 lbs.)

Total refers to the amount of material obtained from production process, while *concentrated* refers to the amount of concentrated agent obtained after final filtration/purification. The *concentrated* number is the amount used to fill munitions.

Media refers to the substance used to provide nutrients for the growth and multiplication of micro-organisms.

Adapted by Anthony H. Cordesman from material provided by the NSC on February 19, 1998.

Copyright Anthony H. Cordesman, all rights reserved.

Digitized by Google

Original from
UNIVERSITY OF CALIFORNIA

Iraq's Search for Weapons of Mass Destruction

Delivery Systems

- Prior to the Gulf War Iraq had extensive delivery systems incorporating long-range strike aircraft with refueling capabilities and several hundred regular and improved, longer-range Scud missiles, some with chemical warheads. These systems included:
  - Tu-16 and Tu-22 bombers.
  - MiG-29 fighters.
  - Mirage F-1, MiG-23BM, and Su-22 fighter attack aircraft.
  - A Scud force with a minimum of 819 missiles.
  - Extended range Al Husayn Scud variants (600 kilometer range) extensively deployed throughout Iraq, and at three fixed sites in northern, western, and southern Iraq.
  - Developing Al-Abbas missiles (900 kilometer range), which could reach targets in Iran, the Persian Gulf, Israel, Turkey, and Cyprus.
  - Long-range super guns with ranges of up to 600 kilometers.
- Iraq also engaged in efforts aimed at developing the Tamuz liquid fueled missile with a range of over 2,000 kilometers, and a solid fueled missile with a similar range. Clear evidence indicates that at least one design was to have a nuclear warhead.
- Iraq attempted to conceal a plant making missile engines from the UN inspectors. It only admitted this plant existed in 1995, raising new questions about how many of its missiles have been destroyed.
- Iraq had design work underway for a nuclear warhead for its long-range missiles.
- The Gulf War deprived Iraq of some of its MiG-29s, Mirage F-1s, MiG-23BMs, and Su-22s.
- Since the end of the war, the UN inspection regime has also destroyed many of Iraq's long-range missiles:
  - UNSCOM has directly supervised the destruction of 48 Scud-type missiles.
  - It has verified the Iraqi unilateral destruction of 83 more missiles and 9 mobile launchers.
- A State Department summary issued on November 16, 1998, indicates that UNSCOM has supervised the destruction of::
  - 48 operational missiles;
  - 14 conventional missile warheads;
  - six operational mobile launchers; 28 operational fixed launch pads;
  - 32 fixed launch pads;
  - 30 missile chemical warheads;
  - other missile support equipment and materials, and a variety of assembled and non-assembled supergun components.
  - 38,537 filled and empty chemical munitions;
  - 90 metric tons of chemical weapons agent;
  - more than 3,000 metric tons of precursor chemicals;
  - 426 pieces of chemical weapons production equipment; and,
  - 91 pieces of related analytical instruments.
- The entire al-Hakam biological weapons production facility and a variety of production equipment and materials.
- The UN estimates that it is able to account for 817 of the 819 long-range missiles that Iraq imported in the period ending in 1988:
  - Pre-1980 expenditures, such as training 8
  - Expenditures during the Iran-Iraq War (1980-1981), including the war
  - of the cities in February-April 1988 516
  - Testing activities for the development of Iraq's modifications of

Copyright Anthony H. Cordesman, all rights reserved.

Digitized by Google

Original from
UNIVERSITY OF CALIFORNIA

- imported missiles and other experimental activities (1985-1990) 69
- Expenditures during the Gulf War (January-March 191) 93
- Destruction under the supervision of UNSCOM 48
- Unilateral destruction by Iraq (mid-July and October 1991 83
- UNSCOM's analysis has shown that Iraq had destroyed 83 of the 85 missiles it had claimed were destroyed. at the same time, it stated that Iraq had not given an adequate account of its proscribed missile assets, including launchers, warheads, and propellants.
  - UNSCOM also reports that it supervised the destruction of 10 mobile launchers, 30 chemical warheads, and 18 conventional warheads.
- Iraq maintains a significant delivery capability consisting of:
  - HY-2, SS-N-2, and C-601 cruise missiles, which are unaffected by UN cease-fire terms.
  - FROG-7 rockets with 70 kilometer ranges, also allowed under UN resolutions.
  - Multiple rocket launchers and tube artillery.
  - Experimental conversions such as the SA-2.
- Iraq claims to have manufactured only 80 missile assemblies, 53 of which were unusable. UNSCOM claims that 10 are unaccounted for.
  - US experts believe Iraq may still have components for several dozen extended-range Scud missiles.
- In addition, Iraq has admitted to:
  - Hiding its capability to manufacture its own Scuds.
  - Developing an extended range variant of the FROG-7 called the Laith. The UN claims to have tagged all existing FROG-7s to prevent any extension of their range beyond the UN imposed limit of 150 kilometers for Iraqi missiles.
  - Experimenting with cruise missile technology and ballistic missile designs with ranges up to 3,000 kilometers.
  - Flight testing Al Husayn missiles with chemical warheads in April 1990.
  - Developing biological warheads for the Al Husayn missile as part of Project 144 at Taji.
  - Initiating a research and development program for a nuclear warhead missile delivery system.
  - Successfully developing and testing a warhead separation system.
  - Indigenously developing, testing, and manufacturing advanced rocket engines to include liquid-propellant designs.
  - Conducting research into the development of Remotely Piloted Vehicles (RPVs) for the dissemination of biological agents.
  - Attempting to expand its Ababil-100 program designed to build surface-to-surface missiles with ranges beyond the permitted 100-150 kilometers.
  - Importing parts from Britain, Switzerland, and other countries for a 350 mm "super gun," as well as starting an indigenous 600 mm supergun design effort.
- Iraq initially claimed that it had 45 missile warheads filled with chemical weapons in 1992. It then stated that it had 20 chemical and 25 biological warheads in 1995. UNSCOM established that it had a minimum of 75 operational warheads and 5 used for trials. It has evidence of the existence of additional warheads. It can only verify that 16 warheads were filled with Sarin, and 34 with chemical warfare binary components, and that 30 were destroyed under its supervision -- 16 with Sarin and 14 with binary components.
- US and UN officials conclude further that:
  - Iraq is trying to rebuild its ballistic missile program using a clandestine network of front companies to obtain the necessary materials and technology from European and Russian firms.
  - This equipment is then concealed and stockpiled for assembly concomitant with the end of the UN inspection regime.
  - The equipment clandestinely sought by Iraq includes advanced missile guidance components, such as accelerometers and gyroscopes, specialty metals, special machine tools, and a high-tech, French-made, million-dollar furnace designed to fabricate engine parts for missiles.

Copyright Anthony H. Cordesman, all rights reserved.

Digitized by Google

Original from
UNIVERSITY OF CALIFORNIA

- Recent major violations and smuggling efforts:
  - In November, 1995, Iraq was found to have concealed an SS-21 missile it had smuggled in from Yemen.
  - Jordan found that Iraq was smuggling missile components through Jordan in early December, 1995. These included 115 gyroscopes in 10 crates, and material for making chemical weapons. The shipment was worth an estimated $25 million. Iraq claimed the gyroscopes were for oil exploration but they are similar to those used in the Soviet SS-N-18 SLBM. UNSCOM also found some gyroscopes dumped in the Tigris.
- Iraq retains the technology it acquired before the war and evidence clearly indicates an ongoing research and development effort, in spite of the UN sanctions regime.
- The fact the agreement allows Iraq to continue producing and testing short-range missiles (less than 150 kilometers range) means it can retain significant missile development effort.
  - The SA-2 is a possible test bed, but UNSCOM has tagged all missiles and monitors all high apogee tests.
  - Iraq's Al-Samoud and Ababil-100 programs are similar test beds. The Al-Samoud is a scaled-down Scud which Iraq seems to have tested.
  - Iraq continues to expand its missile production facility at Ibn Al Haytham, which has two new buildings large enough to make much longer-range missiles.
  - US satellite photographs reveal that Iraq has rebuilt its Al-Kindi missile research facility.
- Ekeus reported on December 18, 1996 that Iraq retained missiles, rocket launchers, fuel, and command system to "make a missile force of significance". UNSCOM reporting as of October, 1997 is more optimistic, but notes that Iraq, "continued to conceal documents describing its missile propellants, and the material evidence relating to its claims to have destroyed its indigenous missile production capabilities indicated in might has destroyed less than a tenth of what it claimed"
- The CIA reported in January 1999 that Iraq is developing two ballistic missiles that fall within the UN-allowed 150-km range restriction. The Al Samoud liquid-propellant missile—described as a scaled-down Scud—began flight-testing in 1997.
- Technicians for Iraq's pre-war Scud missiles are working on the Al Samoud program and, although under UNSCOM supervision, are developing technological improvements that could be applied to future longer-range missile programs. The Ababil-100 solid-propellant missile is also under development, although progress on this system lags the Al Samoud. After economic sanctions are lifted and UN inspections cease, Iraq could utilize expertise from these programs in the development of longer-range missile systems.
- A State Department report in September 1999 noted that:
  - Iraq has refused to credibly account for 500 tons of SCUD propellant, over 40 SCUD biological and conventional warheads, 7 Iraqi-produced Scuds, and truckloads of SCUD components.
  - Iraq refuses to allow inspection of thousands of Ministry of Defense and Military Industries Commission documents relating to biological and chemical weapons and long-range missiles.
- The CIA estimated in September 1999 that although the Gulf war and subsequent United Nations activities destroyed much of Iraq's missile infrastructure, Iraq could test an ICBM capable of reaching the United States during the next 15 years.
  - After observing North Korean activities, Iraq *most likely would pursue* a three-stage Taepo Dong-2 approach to an ICBM (or SLV), which could deliver a several-hundred kilogram payload to parts of the United States. If Iraq could buy a Taepo Dong-2 from North Korea, it *could have a launch capability* within months of the purchase; if it bought Taepo Dong engines, it *could test* an ICBM by the middle of the next decade. Iraq probably would take until the end of the next decade to develop the system domestically.
  - Although much less likely, most analysts believe that if Iraq were to begin development today, it *could test* a much less capable ICBM in a few years using Scud components and based on its prior SLV experience or on the Taepo Dong-1.
  - If it could acquire No Dongs from North Korea, Iraq *could test* a more capable ICBM along the same lines within a few years of the No Dong acquisition.
  - Analysts differ on the likely timing of Iraq's first flight test of an ICBM that could threaten the United States. Assessments include *unlikely* before 2015; and *likely* before 2015, possibly before 2010—foreign assistance would affect the capability and timing.
- The DCI Nonproliferation Center (NPC) reported in February 2000 that Iraq has continued to work on the two SRBM systems authorized by the United Nations: the liquid-propellant Al-Samoud, and the solid-propellant Ababil-100. The Al-Samoud is essentially a scaled-down Scud, and the program allows Baghdad to develop technological improvements that could be applied to a longer range missile program. We believe that the Al-Samoud missile, as designed, is capable of

Copyright Anthony H. Cordesman, all rights reserved.

Digitized by Google

Original from
UNIVERSITY OF CALIFORNIA

exceeding the UN-permitted 150-km-range restriction with a potential operational range of about 180 kilometers. Personnel previously involved with the Condor II/Badr-2000 missile-which was largely destroyed during the Gulf war and eliminated by UNSCOM-are working on the Ababil-100 program. Once economic sanctions against Iraq are lifted, Baghdad probably will begin converting these efforts into longer range missile systems, unless restricted by future UN monitoring.

- Defense intelligence experts say off background that Iraq has rebuilt many of the facilities the US struck in Desert Fox, including 12 factories and sites associated with missile construction and the production of weapons of mass destruction. These are said to include the missile facilities at Al Taji.Ili
- US intelligence reports in June 2000 indicated that Iraq has resumed testing of missiles under 150 kilometers in range, possibly the system modified from the SA-2. They say that the system is not ready for deployment, and that there are problems with the rocket motor, guidance system, and there is no evidence Iraq is ready to start production.
- In late June 2000. Iraq was reported to have carried out eight tests of the Al Samoud missile
- A CIA report in August 2000 summarized the state of missile development in Iraq as follows,
  - Since the Gulf war, Iraq has rebuilt key portions of its chemical production infrastructure for industrial and commercial use, as well as its missile production facilities. It has attempted to purchase numerous dual-use items for, or under the guise of, legitimate civilian use. This equipment—in principle subject to UN scrutiny—also could be diverted for WMD purposes. Since the suspension of UN inspections in December 1998, the risk of diversion has increased.
  - Following Desert Fox, Baghdad again instituted a reconstruction effort on those facilities destroyed by the US bombing, to include several critical missile production complexes and former dual-use CW production facilities. In addition, it appears to be installing or repairing dual-use equipment at CW-related facilities. Some of these facilities could be converted fairly quickly for production of CW agents.
  - Iraq continues to pursue development of two SRBM systems which are not prohibited by the United Nations: the liquid-propellant Al-Samoud, and the solid-propellant Ababil-100. The Al-Samoud is essentially a scaled-down Scud, and the program allows Baghdad to develop technological improvements that could be applied to a longer range missile program. We believe that the Al-Samoud missile, as designed, is capable of exceeding the UN-permitted 150-km-range restriction with a potential operational range of about 180 kilometers. Personnel previously involved with the Condor II/Badr-2000 missile—which was largely destroyed during the Gulf war and eliminated by UNSCOM—are working on the Ababil-100 program. If economic sanctions against Iraq were lifted, Baghdad probably would attempt to convert these efforts into longer range missile systems, regardless of continuing UN monitoring and continuing restrictions on WMD and long-range missile programs.
- A Department of Defense report in January 2001 reported that,
  - Iraq likely retains a limited number of launchers and SCUD-variant SRBMs capable of striking its neighbors, as well as the components and manufacturing means to assemble and produce others, anticipating the reestablishment of a long-range ballistic missile force sometime in the future. Baghdad likely also has warheads capable of delivering chemical or biological agents. While Iraq's missile production infrastructure was damaged during the December 1998 strikes, Iraq retains domestic expertise and sufficient infrastructure to support most missile component production, with the exception of a few critical subelements.
  - During 1999, Iraq continued to work on the two short-range ballistic missile systems that fall within the 150-kilometer range restriction imposed by the UN: the liquid-propellant Al Samoud and the solid-propellant Ababil-100. The Al-Samoud is essentially a scaled-down SCUD, and work on it allows Baghdad to develop technological capabilities that could be applied to a longer-range missile program. We believe that the Al Samoud missile, as designed by the Iraqis, has an inherent potential to exceed the 150-kilometers range restriction imposed under UNSCR 687.
  - Iraqi personnel involved with pre-Desert Storm ballistic missile efforts are working on the Ababil-100 SRBM program. Once economic sanctions against Iraq are lifted, unless restricted by future UN monitoring, Baghdad probably will begin converting these efforts into longer-range missile systems. Despite the damage done to Iraq's missile infrastructure during the Gulf War. Desert Fox, and subsequent UNSCOM activities, Iraq may have ambitions for longer-range missiles, including an ICBM.
  - Depending on the success of acquisition efforts and degree of foreign support, it is possible that Iraq could develop and test an ICBM capable of reaching the United States by 2015. Cruise Missiles and Other Means of Delivery Iraq may have a very limited stockpile of land-launched short-range anti-ship cruise missiles and air-launched short-range tactical missiles that it purchased from China and France prior to the Gulf War. These are potential means of delivery for NBC weapons.
  - Iraq also has a variety of fighter aircraft, helicopters, artillery, and rockets available as potential means of delivery for NBC weapons, although their operational status is questionable due to the cumulative effects of the UN arms embargo. However, Iraq has continued to work on its UAV program, which involves converting L-29 jet trainer aircraft

Copyright Anthony H. Cordesman, all rights reserved.

Digitized by Google

Original from
UNIVERSITY OF CALIFORNIA

originally acquired from Eastern Europe. These modified and refurbished L-29s may be intended for the delivery of chemical or biological agents. In the future, Iraq may try to use its research and development infrastructure to produce its own UAVs and cruise missiles or, should the UN arms embargo be lifted, it could try to purchase cruise missiles.

- A CIA report in January 2002 estimated that,
  - Baghdad's goal of becoming the predominant regional power and its hostile relations with many of its neighbors are the key drivers behind Iraq's ballistic missile program. Iraq has been able to maintain the infrastructure and expertise necessary to develop missiles, and the IC believes it has retained a small, covert force of Scud-type missiles, launchers, and Scud-specific production equipment and support apparatus. For the next several years at least, Iraq's ballistic missile initiatives probably will focus on reconstituting its pre-Gulf war capabilities to threaten regional targets and probably will not advance beyond MRBM systems.
    - Prior to the Gulf war, Iraq had several programs to extend the range of the Scud
    - SRBM and became experienced working with liquid-propellant technology. Since the Gulf war, despite UN resolutions limiting the range of Iraq's missiles to 150 km, Baghdad has been able to maintain the infrastructure and expertise necessary to develop longer range missile systems.
    - A military parade in December 2000 showcased Al Samoud missiles on new transporter-erector-launchers (TELs). The liquid-propellant Al-Samoud SRBM probably will be deployed soon.
    - The IC assesses that Iraq retains a small covert force of Scud-variant missiles, launchers, and conventional, chemical, and biological warheads.
- We cannot project with confidence how long UN-related sanctions and prohibitions will remain in place. They plausibly will constrain Iraq during the entire period of this Estimate. Scenarios that would weaken the prohibitions several years from now also are conceivable, allowing Iraq to reconstitute its missile infrastructure and begin developing long-range missiles before the end of the decade. The discussion that follows addresses developments that *could* and are *likely* to occur should UN prohibitions be significantly weakened in the future.
- Iraq is likely to use its experience with Scud technology to resume production of the pre-Gulf war 650-km-range Al Hussein, the 900-km-range Al Abbas, or other Scud variants, and it could explore clustering and staging options to reach more distant targets. Iraq *could* resume Scud-variant production—with foreign assistance—quickly after UN prohibitions ended.
- With substantial foreign assistance, Baghdad *could* flight-test a domestic MRBM by mid-decade. This possibility presumes rapid erosion of UN prohibitions and Baghdad's willingness to risk detection of developmental steps, such as static engine testing, earlier. An MRBM flight test is *likely* by 2010. An imported MRBM *could* be flight-tested within months of acquisition.
- For the first several years after relief from UN prohibitions, Iraq probably will strive to reestablish its SRBM inventory to pre-Gulf war numbers, continue developing and deploying solid-propellant systems, and pursue MRBMs to keep pace with its neighbors. Once its regional security concerns are being addressed, Iraq may pursue a first-generation ICBM/SLV.
- Although Iraq *could* attempt before 2015 to test a rudimentary long-range missile based on its failed Al-Abid SLV, such a missile almost certainly would fail. Iraq is unlikely to make such an attempt. After observing North Korean missile developments the past few years, Iraq would be more likely to pursue a three-stage TD-2 approach to an SLV or ICBM, which would be capable of delivering a nuclear weapon-sized payload to the United States. Some postulations for potential Iraqi ICBM/SLV concepts and timelines from the beginning of UN prohibition relief include:
  - If Iraq could buy a TD-2 from North Korea, it could have a launch capability within a year or two of a purchase.
  - It could develop and test a TD-1-type system within a few years.
  - If it acquired No Dongs from North Korea, it could test an ICBM within a few years of acquisition by clustering and staging the No Dongs—similar to the clustering of Scuds for the Al Abid SLV.
  - If Iraq bought TD-2 engines, it could test an ICBM within about five years of the acquisition.
  - Iraq could develop and test a Taepo Dong-2-type system within about ten years of a decision to do so.
- Most agencies believe that Iraq is *unlikely* to test before 2015 any ICBMs that would threaten the United States, even if UN prohibitions were eliminated or significantly reduced in the next few years. Some believe that if prohibitions were eliminated in the next few years, Iraq would be *likely* to test an ICBM probably masked as an SLV before 2015, possibly before 2010. In this view, foreign assistance would affect the timing and the capability of the missile.

Copyright Anthony H. Cordesman, all rights reserved.

Digitized by Google

Original from
UNIVERSITY OF CALIFORNIA

- Foreign assistance is key to Iraqi efforts to develop quickly longer range missiles. Iraq relied on extensive foreign assistance before the Gulf war and will continue to seek foreign assistance to expand its current capabilities.

Chemical Weapons

- Iraq is the only major recent user of weapons of mass destruction. US intelligence sources report the following Iraqi uses of chemical weapons:

Date	Area	Type of Gas	Approximate Casualties	Target
August 1983	Haij Umran	Mustard	Less than 100	Iranians/Kurds
October-November 1983	Panjwin	Mustard	3,0000	Iranians/Kurds
February-March 1984	Majnoon Island	Mustard	2,500	Iranians
March 1984	Al Basrah	Tabun	50- 100	Iranians
March 1985	Hawizah Marsh	Mustard/Tabun	3,000	Iranians
February 1996	Al Faw	Mustard/Tabun	8,000-10,000	Iranians
December 1986	Umm ar Rasas	Mustard	1,000s	Iranians
April 1987	Al Basrah	Mustard/Tabun	5,000	Iranians
October 1987	Sumar/Mehran	Mustard/Nerve Agents	3,000	Iranians
March 1988	Halabjah	Mustard/Nerve Agents	Hundreds	Iranians/Kurds

Note: Iranians also used poison gas at Halabjah and may have caused some of the casualties.

- In revelations to the UN, Iraq admitted that, prior to the Gulf War, it:
  - Procured more than 1,000 key pieces of specialized production and support equipment for its chemical warfare program.
  - Maintained large stockpiles of mustard gas, and the nerve agents Sarin and Tabun.
  - Produced binary Sarin filled artillery shells, 122 mm rockets, and aerial bombs.
  - Manufactured enough precursors to produce 70 tons (70,000 kilograms) of the nerve agent VX. These precursors included 65 tons of choline and 200 tons of phosphorous pentasulfide and di-isopropylamine
  - Tested Ricin, a deadly nerve agent, for use in artillery shells.
  - Had three flight tests of long-range Scuds with chemical warheads.
  - Had a large VX production effort underway at the time of the Gulf War. The destruction of the related weapons and feedstocks has been claimed by Iraq, but not verified by UNSCOM. Iraq seems to have had at least 3,800 kilograms of V-agents by time the of the Gulf War, and 12-16 missile warheads.
- The majority of Iraq's chemical agents were manufactured at a supposed pesticide plant located at Muthanna. Various other production facilities were also used, including those at Salman Pak, Samara, and Habbiniyah. Though severely damaged during the war, the physical plant for many of these facilities has been rebuilt.
- Iraq possessed the technology to produce a variety of other persistent and non-persistent agents.
- The Gulf War and the subsequent UN inspection regime may have largely eliminated some of stockpiles and reduced production capability.
- During 1991-1994, UNSCOM supervised the destruction of:
  - 38,537 filled and unfilled chemical munitions.

Copyright Anthony H. Cordesman, all rights reserved.

Digitized by Google

Original from
UNIVERSITY OF CALIFORNIA

- 690 tons of chemical warfare agents.
- More than 3,000 tons of precursor chemicals.
- Over 100 pieces of remaining production equipment at the Muthan State Establishment, Iraq's primary CW research, production, filling and storage site.

- Since that time, UNSCOM has forced new disclosures from Iraq that have led to:
  - The destruction of 325 newly identified production equipment, 120 of which were only disclosed in August, 1997.
  - The destruction of 275 tons of additional precursors.
  - The destruction of 125 analytic instruments.
  - The return of 91 analytic pieces of equipment to Kuwait.
- As of February, 1998, UNSCOM had supervised the destruction of a total of:
  - 40,000 munitions, 28,000 filled and 12,000 empty.
  - 480,000 liters of chemical munitions
  - 1,800,000 liters of chemical precursors.
  - eight types of delivery systems including missile warheads.
- US and UN experts believe Iraq has concealed significant stocks of precursors. Iraq also appears to retain significant amounts of production equipment dispersed before, or during, Desert Storm and not recovered by the UN.
- UNSCOM reports that Iraq has failed to account for
  - Special missile warheads intended for filling with chemical or biological warfare agent.
  - The material balance of some 550 155 mm mustard gas shells, the extent of VX programs, and the rationale for the acquisition of various types of chemical weapons
  - 130 tons of chemical warfare agents.
  - Some 4,000 tons of declared precursors for chemical weapons,
  - The production of several hundred tons of additional chemical warfare agents, the consumption of chemical precursors,
  - 107,500 empty casings for chemical weapons,
  - Whether several thousand additional chemical weapons were filled with agents,
  - The unilateral destruction of 15, 620 weapons, and the fate of 16,038 additional weapons Iraq claimed it had discarded. "The margin of error" in the accounting presented by Iraq is in the neighborhood of 200 munitions."
- Iraq systematically lied about the existence of its production facilities for VX gas until 1995, and made "significant efforts" to conceal its production capabilities after that date. Uncertainties affecting the destruction of its VX gas still affect some 750 tons of imported precursor chemicals, and 55 tons of domestically produced precursors. Iraq has made unverifiable claims that 460 tons were destroyed by Coalition air attacks, and that it unilaterally destroyed 212 tons. UNSCOM has only been able to verify the destruction of 155 tons and destroy a further 36 tons on its own.
- Iraq has developed basic chemical warhead designs for Scud missiles, rockets, bombs, and shells. Iraq also has spray dispersal systems.
- Iraq maintains extensive stocks of defensive equipment.
- The UN feels that Iraq is not currently producing chemical agents, but Iraq has offered no evidence that it has destroyed its VX production capability and/or stockpile. Further, Iraq retains the technology it acquired before the war and evidence clearly indicates an ongoing research and development effort, in spite of the UN sanctions regime.
- Recent UNSCOM work confirms that Iraq did deploy gas-filled 155 mm artillery and 122 mm multiple rocket rounds into the rear areas of the KTO during the Gulf War.
- Iraq's chemical weapons had no special visible markings, and were often stored in the same area as conventional weapons.
- Iraq has the technology to produce stable, highly lethal VX gas with long storage times.
- May have developed improved binary and more stable weapons since the Gulf War.

Copyright Anthony H. Cordesman, all rights reserved.

Digitized by Google

Original from
UNIVERSITY OF CALIFORNIA

- Since 1992, Iraq attempted to covertly import precursors and production equipment for chemical weapons through Qatar, Saudi Arabia, and Jordan since the Gulf War.
- The current status of the Iraqi program is as follows (according to US intelligence as of February 19, 1998 and corrected by the National Intelligence Council on November 16, 1998):

Agent	Declared	Potential Unaccounted For	Comments
Chemical Agents	(Metric Tons)	(Metric Tons)	
VX Nerve Gas	3	300	Iraq lied about the program until 1995
GAgents (Sarin)	100-150	200	Figures include weaponized and bulk agents
Mustard Gas	500-600	200	Figures include weaponized and bulk agents
Delivery Systems	(Number)	(Number)	
Missile Warheads	75-100	2-25	UNSCOM supervised destruction of 30
Rockets	100,000	15,000-25,000	UNSCOM supervised destruction of 40,000, 28,000 of which were filled.
Aerial Bombs	16,000	2,000-8,000	High estimate reflects the data found in an Iraqi Air Force document in July, 1998.
Artillery shells	30,000	15,000	
Aerial Spray Tanks	?	?	

- A US State Department spokesman reported on November 16, 1998 that Iraq has reported making 8,800 pounds (four tons) of VX nerve gas, 220,000 pounds (100 tons) to 330,000 pounds (150 tons) of nerve agents such as Sarin and 1.1 million pounds (500 tons) to 1.32 million pounds (600 tons) of mustard gas. Data from UN weapons inspectors indicates that Iraq may have produced an additional 1.32 million pounds (600-tons) of these agents, divided evenly among the three. "In other words, these are the differences between what they say they have and what we have reason to believe they have."
- UNSCOM reported to the Security Council in December 1998 that Iraq continued to withhold information related to its CW and BW programs.
  - For example, Baghdad seized from UNSCOM inspectors an Air Force document discovered by UNSCOM that indicated that Iraq had not consumed as many CW munitions during the Iran-Iraq War in the 1980s as had been declared by Baghdad. This discrepancy indicates that Iraq may have an additional 6,000 CW munitions hidden.
  - We do not have any direct evidence that Iraq has used the period since Desert Fox to reconstitute its WMD programs, although given its past behavior, this type of activity must be regarded as likely. We assess that since the suspension of UN inspections in December of 1998, Baghdad has had the capability to reinitiate both its CW and BW programs within a few weeks to months, but without an inspection monitoring program, it is difficult to determine if Iraq has done so. We know, however, that Iraq has continued to work on its unmanned aerial vehicle (UAV) program, which involves converting L-29 jet trainer aircraft originally acquired from Eastern Europe. These modified and refurbished L-29s are believed to be intended for delivery of chemical or biological agents.
- The CIA reported in January 1999 that Iraq had purchased numerous dual-use items for legitimate civilian projects—in principle subject to UN scrutiny—that also could be diverted for WMD purposes. Since the Gulf war, Baghdad has rebuilt key portions of its chemical production infrastructure for industrial and commercial use. Some of these facilities could be converted fairly quickly for production of CW agents. The recent discovery that Iraq had weaponized the advanced nerve agent VX and the convincing evidence that fewer CW munitions were consumed during the Iran-Iraq war than Iraq had declared provide strong indications that Iraq retains a CW capability and intends to reconstitute its pre-Gulf war capability as rapidly as possible once sanctions are lifted.
- A State Department report in September 1999 noted that:
  - In July 1998, Iraq seized from the hands of UNSCOM inspectors an Iraqi Air Force document indicating that Iraq had misrepresented the expenditure of over 6,000 bombs which may have contained over 700 tons of chemical agent. Iraq continues to refuse to provide this document to the UN.
  - Iraq continues to deny weaponizing VX nerve agent, despite the fact that UNSCOM found VX nerve agent residues on Iraqi SCUD missile warhead fragments. Based on its investigations, international experts concluded that "Iraq has the know-how and process equipment, and may possess precursors to manufacture as much as 200 tons of VX ... The retention of a VX capability by Iraq cannot be excluded by the UNSCOM international expert team."

Copyright Anthony H. Cordesman, all rights reserved.

Digitized by Google

Original from
UNIVERSITY OF CALIFORNIA

- The DCI Nonproliferation Center (NPC) reported in February 2000 that "We do not have any direct evidence that Iraq has used the period since Desert Fox to reconstitute its WMD programs, although given its past behavior, this type of activity must be regarded as likely. The United Nations assesses that Baghdad has the capability to reinitiate both its CW and BW programs within a few weeks to months, but without an inspection monitoring program, it is difficult to determine if Iraq has done so." It also reported that,
  - Since Operation Desert Fox in December 1998, Baghdad has refused to allow United Nations inspectors into Iraq as required by Security Council Resolution 687. As a result, there have been no UN inspections during this reporting period, and the automated video monitoring system installed by the UN at known and suspect WMD facilities in Iraq has been dismantled by the Iraqis. Having lost this on-the-ground access, it is difficult for the UN or the US to accurately assess the current state of Iraq's WMD programs.
  - Since the Gulf war, Iraq has rebuilt key portions of its chemical production infrastructure for industrial and commercial use, as well as its missile production facilities. It has attempted to purchase numerous dual-use items for, or under the guise of, legitimate civilian use. This equipment-in principle subject to UN scrutiny-also could be diverted for WMD purposes. Following Desert Fox, Baghdad again instituted a reconstruction effort on those facilities destroyed by the US bombing, to include several critical missile production complexes and former dual-use CW production facilities. In addition, it appears to be installing or repairing dual-use equipment at CW-related facilities. Some of these facilities could be converted fairly quickly for production of CW agents.
  - The United Nations Special Commission on Iraq (UNSCOM) reported to the Security Council in December 1998 that Iraq continued to withhold information related to its CW and BW programs. For example, Baghdad seized from UNSCOM inspectors an Air Force document discovered by UNSCOM that indicated that Iraq had not consumed as many CW munitions during the Iran-Iraq War in the 1980s as declared by Baghdad. This discrepancy indicates that Iraq may have an additional 6,000 CW munitions hidden. This intransigence on the part of Baghdad ultimately led to the Desert Fox bombing by the US.
  - Iraqi defector claims in February 2000 that Iraq had maintained a missile force armed with chemical and biological warheads that can bee deployed from secret locations, and they that warheads are stored separately near Baghdad and have been deployed to the missiles in the field in exercises.iv
- A CIA report in August 2000 summarized the state of chemical weapons proliferation in Iraq as follows,
  - Since Operation Desert Fox in December 1998, Baghdad has refused to allow United Nations inspectors into Iraq as required by Security Council Resolution 687. Although UN Security Council Resolution (UNSCR) 1284, adopted in December 1999, established a follow-on inspection regime to the United Nations Special Commission on Iraq (UNSCOM) in the form of the United Nations Monitoring, Verification, and Inspection Committee (UNMOVIC), there have been no UN inspections during this reporting period. Moreover, the automated video monitoring system installed by the UN at known and suspect WMD facilities in Iraq has been dismantled by the Iraqis. Having lost this on-the-ground access, it is difficult for the UN or the US to accurately assess the current state of Iraq's WMD programs.
  - Since the Gulf war, Iraq has rebuilt key portions of its chemical production infrastructure for industrial and commercial use, as well as its missile production facilities. It has attempted to purchase numerous dual-use items for, or under the guise of, legitimate civilian use. This equipment—in principle subject to UN scrutiny—also could be diverted for WMD purposes. Since the suspension of UN inspections in December 1998, the risk of diversion has increased.
  - Following Desert Fox, Baghdad again instituted a reconstruction effort on those facilities destroyed by the US bombing, to include several critical missile production complexes and former dual-use CW production facilities. In addition, it appears to be installing or repairing dual-use equipment at CW-related facilities. Some of these facilities could be converted fairly quickly for production of CW agents.
- A Department of Defense report in January 2001 reported that,
  - Since the Gulf War, Baghdad has rebuilt key portions of its industrial and chemical production infrastructure; it has not become a state party to the CWC. Some of Iraq's facilities could be converted fairly quickly to production of chemical warfare agents. Following Operation Desert Fox, Baghdad again instituted a rapid reconstruction effort on those facilities to include former dual-use chemical warfare-associated production facilities, destroyed by U.S. bombing. In 1999, Iraq may have begun installing or repairing dual-use equipment at these and other chemical war-fare-related facilities. Previously, Iraq was known to have produced and stockpiled mustard, tabun, sarin, and VX, some of which likely remain hidden. It is likely that an additional quantity of various precursor chemicals also remains hidden.
  - In late 1998, UNSCOM reported to the UN Security Council that Iraq continued to withhold information related to its chemical program. UNSCOM cited an example where Baghdad seized from inspectors a document discovered by UNSCOM inspectors, which indicated that Iraq had not consumed as many chemical munitions during the Iran-Iraq War as had been declared previously by Baghdad. This document suggests that Iraq may have an additional 6,000 chemical munitions hidden. Similarly, UNSCOM discovery in 1998 of evidence of VX in Iraqi missile warheads

Copyright Anthony H. Cordesman, all rights reserved.

Digitized by Google

Original from
UNIVERSITY OF CALIFORNIA

showed that Iraq had lied to the international community for seven years when it repeatedly said that it had never weaponized VX.

- Iraq retains the expertise, once a decision is made, to resume chemical agent production within a few weeks or months, depending on the type of agent. However, foreign assistance, whether commercial procurement of dual-use technology, key infrastructure, or other aid, will be necessary to completely restore Iraq's chemical agent production capabilities to pre-Desert Storm levels. Iraqi doctrine for the use of chemical weapons evolved during the Iran-Iraq War, and was fully incorporated into Iraqi offensive operations by the end of the war in 1988. During different stages of that war, Iraq used aerial bombs, artillery, rocket launchers, tactical rockets, and sprayers mounted in helicopters to deliver agents against Iranian forces. It also used chemical agents against Kurdish elements of its own civilian population in 1988.

Biological Weapons

- Had highly compartmented "black" program with far tighter security regulations than chemical program.
- Had 18 major sites for some aspect of biological weapons effort before the Gulf War. Most were nondescript and had no guards or visible indications they were a military facility.
- The US targeted only one site during the Gulf War. It struck two sites, one for other reasons. It also struck at least two targets with no biological facilities that it misidentified.
- Systematically lied about biological weapons effort until 1995. First stated that had small defensive efforts, but no offensive effort. In July, 1995, admitted had a major defensive effort. In October, 1995, finally admitted major weaponization effort.
- Iraq has continued to lie about its biological weapons effort since October, 1995. It has claimed the effort was headed by Dr. Taha, a woman who only headed a subordinate effort. It has not admitted to any help by foreign personnel or contractors. It has claimed to have destroyed its weapons, but the one site UNSCOM inspectors visited showed no signs of such destruction and was later said to be the wrong site. It has claimed only 50 people were employed full time, but the scale of the effort would have required several hundred.
- Since July 1995, Iraq has presented three versions of FFCDs and four "drafts."
  - The most recent FFCD was presented by Iraq on 11 September 1997. This submission followed the UNSCOM's rejection, of the FFCD of June 1996. In the period since receiving that report, UNSCOM conducted eight inspections in an attempt to investigate critical areas of Iraq's proscribed activities such as warfare agent production and destruction, biological munitions manufacturing, filling and destruction, and military involvement in and support to the proscribed program. Those investigations, confirmed the assessment that the June 1996 declaration was deeply deficient. The UNSCOM concluded that the new FFCD, it received on 11 September 1997, contains no significant changes from the June 1996 FFCD
- Iraq has not admitted to the production of 8,500 liters of anthrax, 19,000 liters of Botulinum toxin, 2,200 liters of Aflatoxin,
- Reports indicate that Iraq tested at least 7 principal biological agents for use against humans.
  - Anthrax, Botulinum, and Aflatoxin are known to be weaponized.
  - Looked at viruses, bacteria, and fungi. Examined the possibility of weaponizing gas gangrene and Mycotoxins. Some field trials were held of these agents.
  - Examined foot and mouth disease, haemorrhagic conjunctivitis virus, rotavirus, and camel pox virus.
  - Conducted research on a "wheat pathogen" and a Mycotoxin similar to "yellow rain" defoliant.
- The "wheat smut" was first produced at Al Salman, and then put in major production during 1987-1988 at a plant near Mosul. Iraq claims the program was abandoned.
- The August 1995 defection of Lieutenant general Husayn Kamel Majid, formerly in charge of Iraq's weapons of mass destruction, revealed the extent of this biological weapons program. Lt. General Kamel's defection prompted Iraq to admit that it:
- Imported at least 39 tons of growth media (31,000 kilograms or 68,200 pounds) for biological agents obtained from three European firms. According to UNSCOM, 3,500 kilograms or 7,700 pounds) remains unaccounted for. Some estimates go as high as 17 tons. Each ton can be used to produce 10 tons of bacteriological weapons.
- Other reports indicate that Iraq obtained nearly 40 tons of the medium to grow anthrax and botulinum bacterium for its biological weapons program from Oxoid Ltd, and other suppliers in the UK in 1988.
  - Imported type cultures from the US which can be modified to develop biological weapons. Tried to import the Ames strain of Anthrax from the US but does not seem to have succeeded. Did import the Sterne and A-3 strains of Anthrax from the Institut Pasteur in France, and two Vollum strains and five other strains of Anthrax from the American Type

Copyright Anthony H. Cordesman, all rights reserved.

Digitized by Google

Original from
UNIVERSITY OF CALIFORNIA

Culture collection, located near Manassas, Virginia. Vollum 1B is the strain of Anthrax the US developed for its own biological weapons program before it signed the BWC.

- Had a laboratory- and industrial-scale capability to manufacture various biological agents including the bacteria which cause Anthrax and botulism; Aflatoxin, a naturally occurring carcinogen; clostridium perfringens, a gangrene-causing agent; the protein toxin Ricin; tricothecene Mycotoxins, such as T-2 and DAS; and an anti-wheat fungus known as wheat cover smut. Iraq also conducted research into the rotavirus, the camel pox virus and the virus which causes haemorrhagic conjunctivitis.
- Created at least seven primary production facilities including the Sepp Institute at Muthanna, the Ghazi Research Institute at Amaria, the Daura Foot and Mouth Disease Institute, and facilities at Al-Hakim, Salman Pak Taji, and Fudaliyah. According to UNSCOM, weaponization occurred primarily at Muthanna through May, 1987 (largely Botulinum), and then moved to Al Salman. (Anthrax). In March, 1988 a plant was open at Al Hakim, and in 1989 an Aflatoxin plant was set up at Fudaliyah.
- Had test site about 200 kilometers west of Baghdad, used animals in cages and tested artillery and rocket rounds against live targets at ranges up to 16 kilometers.
- Took fermenters and other equipment from Kuwait to improve effort during the Gulf War.

- Iraq had least 79 civilian facilities capable of playing some role in biological weapons production still in existence in 1997.
- The Iraqi program involving Aflatoxin leaves many questions unanswered.
  - Iraqi research on Aflatoxin began in May 1988 at Al Salman, where the toxin was produced by the growth of fungus aspergilus in 5.3 quart flasks.
  - The motives behind Iraq's research on Aflatoxin remain one of the most speculative aspects of its program. Aflatoxin is associated with fungal-contaminated food grains, and is considered non-lethal. It normally can produce liver cancer, but only after a period of months to years and in intense concentrations. There is speculation, however, that a weaponized form might cause death within days and some speculation that it can be used as an incapacitating agent.
  - Iraq moved its production of Aflatoxin to Fudaliyah in 1989, and produced 481 gallons of toxin in solution between November, 1988 and May, 1990.
  - Produced 1,850 liters of Aflatoxin in solution at Fudaliyah.
  - It produced a total of at least 2,500 liters of concentrated Aflatoxin (1,850 liters filled into munitions).
  - It developed 16 R-400 Aflatoxin bombs and two Scud warheads. Conducted trials with Aflatoxin in 122 mm rockets and R-400 bombs in November 1989 and May and August 1990. Produced a total of 572 gallons of toxin and loaded 410.8 gallons into munitions.
  - UNSCOM concluded in October, 1997, that Iraq's accounting for its Aflatoxin production was not credible.
- Total Iraqi production of more orthodox biological weapons reached at least 19,000 liters of concentrated Botulinum (10,000 liters filled into munitions); and 8,500 liters of concentrated Anthrax (6,500 liters filled into munitions):
  - It manufactured 6,000 liters of concentrated Botulinum toxin and 8,425 liters of Anthrax at Al-Hakim during 1990; 5400 liters of concentrated Botulinum toxin at the Daura Foot and Mouth Disease Institute from November 1990 to January 15, 1991; 400 liters of concentrated Botulinum toxin at Taji; and 150 liters of concentrated Anthrax at Salman Pak.
  - Iraq acknowledged to UN SCOM that it had produced at least 19,000 liters of botulinum toxin, using more than half to fill at least 116 bombs and missile warheads.
  - Filled at least 50 bombs and missile warheads with a wet Anthrax agent using the Vollum strain, or one very similar.
  - Some Al Hussein warheads were found at the Al-Nibal missile destruction site with traces of wet Anthrax agent, similar to the Vollum strain.
  - Vials were found with a dry freeze-dried Anthrax agent of the Vollum strain; reports differ as the whether Iraq weaponized a dry clay coated of the particle size most lethal for delivering inhaled Anthrax, and clay coated the particles to eliminate the electrostatic charge and ensure optimal dispersion.
- Iraq is also known to have produced at least:
  - 340 liters of concentrated clostridium perfringens, a gangrene-causing biological agent, beginning in August 1990.
  - 10 liters of concentrated Ricin at Al Salam. Claim abandoned work after tests failed.
- Iraq weaponized at least three biological agents for use in the Gulf War. The weaponization consisted of at least:

Copyright Anthony H. Cordesman, all rights reserved.

Digitized by Google

Original from
UNIVERSITY OF CALIFORNIA

- 100 bombs and 16 missile warheads loaded with Botulinum.
- 50 R-400 air-delivered bombs and 5 missile warheads loaded with anthrax; and
- 4 missile warheads and 7 R-400 bombs loaded with Aflatoxin, a natural carcinogen.
- The warheads were designed for operability with the Al Husayn Scud variant.

* Iraq had other weaponization activities:
  - Armed 155 mm artillery shells and 122 mm rockets with biological agents.
  - Conducted field trials, weaponization tests, and live firings of 122 mm rockets armed with Anthrax and Botulinum toxin from March 1988 to May 1990.
  - Tested Ricin, a deadly protein toxin, for use in artillery shells.
  - Iraq produced at least 191 bombs and 25 missile warheads with biological agents.
  - Developed and deployed 250 pound aluminum bombs coverage in fiberglass. Bombs were designed so they could be mounted on both Soviet and French-made aircraft. They were rigged with parachutes for low altitudes drops to allow efficient slow delivery and aircraft to fly under radar coverage. Some debate over whether bombs had cluster munitions or simply dispersed agent like LD-400 chemical bomb.
  - Deployed at least 166 R-400 bombs with 85 liters of biological agents each during the Gulf War. Deployed them at two sites. One was near an abandoned runway where it could fly in aircraft, arm them quickly, and disperse with no prior indication of activity and no reason for the UN to target the runway.
  - Filled at least 25 Scud missile warheads, and 157 bombs and aerial dispensers, with biological agents during the Gulf War.
* Developed and stored drop tanks ready for use for three aircraft or RPV s with the capability of dispersing 2,000 liters of anthrax. Development took place in December 1990. Claimed later that tests showed the systems were ineffective.
  - The UN found, however, that Iraq equipped crop spraying helicopters for biological warfare and held exercises and tests simulating the spraying of Anthrax spores.
  - Iraqi Mirages were given spray tanks to disperse biological agents.
    - Held trials as late as January 13, 1991.
    - The Mirages were chosen because they have large 2,200 liter belly tanks and could be refueled by air, giving them a longer endurance and greater strike range.
    - The tanks had electric valves to allow the agent to be released and the system was tested by releasing simulated agent into desert areas with scattered petri dishes to detect the biological agent. UNSCOM has video tapes of the aircraft.
* Project 144 at Taji produced at least 25 operational Al Husayn warheads. Ten of these were hidden deep in a railway tunnel, and 15 in holes dug in an unmanned hide site along the Tigris.
* Biological weapons were only distinguished from regular weapons by a black stripe.
* The UN claims that Iraq has offered no evidence to corroborate its claims that it destroyed its stockpile of biological agents after the Gulf War. Further, Iraq retains the technology it acquired before the war and evidence clearly indicates an ongoing research and development effort, in spite of the UN sanctions regime.
* UNSCOM reported in October 1997 that:
  - Iraq has never provided a clear picture of the role of its military in its biological warfare program, and has claimed it only played a token role.
  - It has never accounted for its disposal of growth media. The unaccounted for media is sufficient, in quantity, for the production of over three times more of the biological agent -- Anthrax -- Iraq claims to have been produced.
  - Bulk warfare agent production appears to be vastly understated by Iraq. Expert calculations of possible agent production quantities, either by equipment capacity or growth media amounts, far exceed Iraq's stated results
  - Significant periods when Iraq claims its fermenters were not utilized are unexplained
  - Biological warfare field trials are underreported and inadequately described.

Copyright Anthony H. Cordesman, all rights reserved.

Digitized by Google

Original from
UNIVERSITY OF CALIFORNIA

- Claims regarding field trials of chemical and biological weapons using R400 bombs are contradictory and indicate that, "more munitions were destroyed than were produced.
- The Commission is unable to verify that the unilateral destruction of the BW-filled Al Hussein warheads has taken place."
- There is no way to confirm whether Iraq destroyed 157 bombs of the R400 type, some of which were filled with Botulin or anthrax spores.
- "The September 1997 FFCD fails to give a remotely credible account of Iraq's biological program. This opinion has been endorsed by an international panel of experts."

- The current status of the Iraqi program is as follows (according to US intelligence as of February 19, 1998):

Agent	Declared Concentrated Amount Liters	Gallons	Declared Total Amount Liters	Gallons	Uncertainty	
Anthrax	8500		12,245	85000	22457	Could be 3-4 times declared amount
Botulinum toxin	19,400		NA	380,000	NA	Probably twice declared amount. Some extremely concentrated.
Gas Gangrene Clostridium Perfingens	340		90	3,400	900	Amounts could be higher
Aflatoxin	NA		NA	2,200	581	Major uncertainties
Ricin	NA		NA	10	2.7	Major uncertainties

- UNSCOM cannot confirm the unilateral destruction of 25 warheads. It can confirm the destruction of 23 of at least 157 bombs. Iraq may have more aerosol tanks.
- UNSCOM used to inspects 79 sites -- 5 used to make weapons before war; 5 vaccine or pharmaceutical sites; 35 research and university sites; thirteen breweries, distilleries, and dairies with dual-purpose capabilities; eight diagnostic laboratories.
- Iraq retains laboratory capability to manufacture various biological agents including the bacteria which cause anthrax, botulism, tularemia and typhoid.
- Many additional civilian facilities are capable of playing some role in biological weapons production.
- A State Department spokesman reported on November 16, 1998 that there is a large discrepancy between the amount of biological growth media -procured and the amount of agents that were or could have been produced. Baghdad has not adequately explained where some 8,000 pounds (3,500 kg) of the material went out of some 68,000 pounds (31,000 kg) of biological growth media it imported. Iraq's accounting of the amount of the agent it produced and the number of failed batches is seriously flawed and cannot be reconciled on the basis of this full disclosure Iraq has made.
- The CIA reported in January 1999 that Iraq continues to refuse to disclose fully the extent of its BW program. After four years of denials, Iraq admitted to an offensive program resulting in the destruction of Al Hakam-a large BW production facility Iraq was trying to hide as a legitimate biological plant. Iraq still has not accounted for over a hundred BW bombs and over 80 percent of imported growth media-directly related to past and future Iraqi production of thousands of gallons of biological agent. This lack of cooperation is an indication that Baghdad intends to reconstitute its BW capability when possible.
- A State Department report in September 1999 noted that:
  - Iraq refuses to allow inspection of thousands of Ministry of Defense and Military Industries Commission documents relating to biological and chemical weapons and long-range missiles.
  - In 1995, Iraqis who conducted field trials of R-400 bombs filled with biological agents described the tests to UNSCOM experts in considerable detail, including the use of many animals. These field trials were reflected in Iraq's June 1996 biological weapons declaration. Yet, amazingly, Iraq now denies that any such trials were conducted at all.

Copyright Anthony H. Cordesman, all rights reserved.

Digitized by Google

Original from UNIVERSITY OF CALIFORNIA

- In September 1995, Iraq finally declared the existence of two projects to disseminate biological agents from Mirage F-1 and MiG-21 aircraft, yet there is no evidence that the prototype weapons and aircraft were ever destroyed. There is also no evidence that the 12 Iraqi helicopter-borne aerosol generators for biological weapon delivery were ever destroyed.
- Apart from one document referring to a single year, no Iraqi biological weapon production records have been given to the UN—no records of storage, of filling into munitions, or of destruction. This is why UNSCOM refers to Iraq's biological weapons program—which deployed SCUD missile warheads filled with anthrax and botulinum toxin to be ready for use against Coalition forces—as a "black hole."
  - The Iraqis have repeatedly changed their story about their biological weapons warheads. Iraq has revised several times its declarations regarding the precise locations of warhead destruction and the fill of warheads. The movements of concealed warheads prior to unilateral destruction, claimed by Iraq, have been proven to be false.
- The DCI Nonproliferation Center (NPC) reported in February 2000 that "We do not have any direct evidence that Iraq has used the period since Desert Fox to reconstitute its WMD programs, although given its past behavior, this type of activity must be regarded as likely. The United Nations assesses that Baghdad has the capability to reinitiate both its CW and BW programs within a few weeks to months, but without an inspection monitoring program, it is difficult to determine if Iraq has done so."
- Iraqi defector claims in February 2000 that Iraq had maintained a missile force armed with chemical and biological warheads that can bee deployed from secret locations, and they that warheads are stored separately near Baghdad and have been deployed to the missiles in the field in exercises.v
- George Tenet, the Director of the CIA, testified before the Senate Foreign Relations Committee on March 20, and identified Iraq as a key country seeking biological weapons.
- A CIA report in August 2000 summarized the state of biological weapons proliferation in Iraq as follows,vi
  - Since Operation Desert Fox in December 1998, Baghdad has refused to allow United Nations inspectors into Iraq as required by Security Council Resolution 687. Although UN Security Council Resolution (UNSCR) 1284, adopted in December 1999, established a follow-on inspection regime to the United Nations Special Commission on Iraq (UNSCOM) in the form of the United Nations Monitoring, Verification, and Inspection Committee (UNMOVIC), there have been no UN inspections during this reporting period. Moreover, the automated video monitoring system installed by the UN at known and suspect WMD facilities in Iraq has been dismantled by the Iraqis. Having lost this on-the-ground access, it is difficult for the UN or the US to accurately assess the current state of Iraq's WMD programs.
  - Since the Gulf war, Iraq has rebuilt key portions of its chemical production infrastructure for industrial and commercial use, as well as its missile production facilities. It has attempted to purchase numerous dual-use items for, or under the guise of, legitimate civilian use. This equipment—in principle subject to UN scrutiny—also could be diverted for WMD purposes. Since the suspension of UN inspections in December 1998, the risk of diversion has increased.
  - Following Desert Fox, Baghdad again instituted a reconstruction effort on those facilities destroyed by the US bombing, to include several critical missile production complexes and former dual-use CW production facilities. In addition, it appears to be installing or repairing dual-use equipment at CW-related facilities. Some of these facilities could be converted fairly quickly for production of CW agents.
  - UNSCOM reported to the Security Council in December 1998 that Iraq continued to withhold information related to its CW and BW programs. For example, Baghdad seized from UNSCOM inspectors an Air Force document discovered by UNSCOM that indicated that Iraq had not consumed as many CW munitions during the Iran-Iraq War in the 1980s as had been declared by Baghdad. This discrepancy indicates that Iraq may have an additional 6,000 CW munitions hidden.
  - We do not have any direct evidence that Iraq has used the period since Desert Fox to reconstitute its WMD programs, although given its past behavior, this type of activity must be regarded as likely. We assess that since the suspension of UN inspections in December of 1998, Baghdad has had the capability to reinitiate both its CW and BW programs within a few weeks to months, but without an inspection monitoring program, it is difficult to determine if Iraq has done so. We know, however, that Iraq has continued to work on its unmanned aerial vehicle (UAV) program, which involves converting L-29 jet trainer aircraft originally acquired from Eastern Europe. These modified and refurbished L-29s are believed to be intended for delivery of chemical or biological agents.
- A Department of Defense report in January 2001 stated that Iraq's continued refusal to disclose fully the extent of its biological program suggests that Baghdad retains a biological warfare capability, despite its membership in the BWC. After four and one-half years of claiming that it had conducted only "defensive research" on biological weapons Iraq declared reluctantly, in 1995, that it had produced approximately 30,000 liters of bulk biological agents and/or filled munitions. Iraq

Copyright Anthony H. Cordesman, all rights reserved.

Digitized by Google

Original from
UNIVERSITY OF CALIFORNIA

admitted that it produced anthrax, botulinum toxins and aflatoxins and that it prepared biological agent-filled munitions, including missile warheads and aerial bombs. However, UNSCOM believed that Iraq had produced substantially greater amounts than it has admitted —three to four times greater. Iraq also admitted that, during the Persian Gulf War, it had deployed biological agent-filled munitions to air-fields and that these weapons were intended for use against Israel and coalition forces in Saudi Arabia. Iraq stated that it destroyed all of these agents and munitions in 1991, but it has provided insufficient credible evidence to support this claim. The UN believes that Baghdad has the ability to reconstitute its biological warfare capabilities within a few weeks or months, and, in the absence of UNSCOM inspections and monitoring during 1999 and 2000, we are concerned that Baghdad again may have produced some biological warfare agents.

Nuclear Weapons

- Inspections by UN teams have found evidence of two successful weapons designs, a neutron initiator, explosives and triggering technology needed for production of bombs, plutonium processing technology, centrifuge technology, Calutron enrichment technology, and experiments with chemical separation technology. Iraq had some expert technical support, including at least one German scientist who provided the technical plans for the URENCO TC-11 centrifuge.
- Iraq's main nuclear weapons related facilities were:
  - Al Atheer - center of nuclear weapons program. Uranium metallurgy; production of shaped charges for bombs, remote controlled facilities for high explosives manufacture.
  - Al Tuwaitha - triggering systems, neutron initiators, uranium metallurgy, and hot cells for plutonium separation. Laboratory production of UO_2, UCL_4, UF_6, and fuel fabrication facility. Prototype-scale gas centrifuge, prototype EMIS facility, and testing of laser isotope separation technology.
  - Al Qa Qa - high explosives storage, testing of detonators for high explosive component of implosion nuclear weapons.
  - Al Musaiyib/Al Hatteen - high explosive testing, hydrodynamic studies of bombs.
  - Al Hadre - firing range for high explosive devices, including FAE.
  - Ash Sharqat - designed for mass production of weapons grade material using EMIS.
  - Al Furat - designed for mass production of weapons grade material using centrifuge method.
  - Al Jesira (Mosul) - mass production of UCL_4.
  - Al Qaim - phosphate plant for production of U308.
  - Akashat uranium mine.
- Iraq had three reactor programs:
  - Osiraq/Tammuz I 40 megawatt light-water reactor destroyed by Israeli air attack in 1981.
  - Isis/Tammuz II 800 kilowatt light water reactor destroyed by Coalition air attack in 1991.
  - IRT-5000 5 megawatt light water reactor damaged by Coalition air attack in 1991.
- Iraq used Caluiron (EMIS), centrifuges, plutonium processing, chemical defusion and foreign purchases to create new production capability after Israel destroyed most of Osiraq.
- Iraq established a centrifuge enrichment system in Rashidya and conducted research into the nuclear fuel cycle to facilitate development of a nuclear device.
- After invading Kuwait, Iraq attempted to accelerate its program to develop a nuclear weapon by using radioactive fuel from French and Russian-built reactors. It made a crash effort in September, 1990 to recover enriched fuel from its supposedly safe-guarded French and Russian reactors, with the goal of producing a nuclear weapon by April, 1991. The program was only halted after Coalition air raids destroyed key facilities on January 17, 1991.
- Iraq conducted research into the production of a radiological weapon, which disperses lethal radioactive material without initiating a nuclear explosion.
- Orders were given in 1987 to explore the use of radiological weapons for area denial in the Iran-Iraq War.
  - Three prototype bombs were detonated at test sites -- one as a ground level static test and two others were dropped from aircraft.
  - Iraq claims the results were disappointing and the project was shelved but has no records or evidence to prove this.
- UN teams have found and destroyed, or secured, new stockpiles of illegal enriched material, major production and R&D facilities, and equipment-- including Calutron enriching equipment.

Copyright Anthony H. Cordesman, all rights reserved.

Digitized by Google

Original from
UNIVERSITY OF CALIFORNIA

- UNSCOM believes that Iraq's nuclear program has been largely disabled and remains incapacitated, but warns that Iraq retains substantial technology and established a clandestine purchasing system in 1990 that it has used to impor: forbidden components since the Gulf War.
    - The major remaining uncertainties are:
    - Iraq still retains the technology developed before the Gulf War and US experts believe an ongoing research and development effort continues, in spite of the UN sanctions regime.
    - Did Iraq conceal an effective high speed centrifuge program.
    - Are there elements for radiological weapons.
    - Is it actively seeking to clandestinely buy components for nuclear weapons and exami9ning the purchase of fissile material from outside Iraq.
    - Is .t continuing with the development of a missile warhead suited to the use of a nuclear device.
    - A substantial number of declared nuclear weapons components and research equipment has never been recovered. There is no reason to assume that Iraqi declarations were comprehensive.
- Work by David Albright indicates that Iraq still holds approximately 1.7 metric tons (MT) of low-enriched uranium (LEU) and several hundred MT of natural uranium. He estimates that if Iraq should master one of the uranium enrichment technologies that it was pursuing before the Gulf War, its LEU stock would provide a means to rapidly make enough HEU for at least one nuclear weapon, and that the natural uranium could become the feedstock for many more. This uranium remains in Iraq because the UN Action Team did not have a mandate under resolution 687 to "remove, destroy or render harmless" this uranium. Without further enrichment or irradiation in a nuclear reactor, it is not "weapons-usable nuclear material."
- Dr. Khidhir Hamza a highest-ranking Iraqi scientist who defected from Iraq claims Iraqi scientists were commanded to build one nuclear bomb immediate.y after Saddam invaded Kuwait in 1990, and that the resulting device was crude and untestec and might even could fall apart. In an April 2, 2001 edition of Middle East Forum Wire, he says that,
    - Iraq still runs its nuclear program and distributes its nuclear program infrastructure among dozens of small corporations, as it does with biological and chemical weapons.
    - One group was responsible for enrichment of uranium by diffusion, and did this under the front of a large refinery in Baghdad. A refinery and a uranium enrichment plant require similar piping, structures, compressors, and handling of gases. He says
    - His assistant, who designed bombs under Hamza, is now running the program while also doing seismic prospecting for oil maps. Apart from designing weapons, he engineers underground explosions that generate seismic waves in order to locate oil. When an inspector visits, all programs relating to the bomb design are put aside, and replaced with seismic prospecting maps. The bomb designer is a real expert at seismic prospecting, so he is very convincing to the inspectors.
    - In a 1998, New York Times interview, he stated that Iraq was three years away from nuclear capability. Sadly, inspections ceased that same year. Three years have passed, and Saddam is undoubtedly on the precipice of nuclear power.
    - He now estimates that Iraq will have between three to five nuclear weapons by 2005. Iraq now has twelve tons of uranium and 1.3 tons of low enriched uranium. This is enough for at least four bombs already.
- The CIA reported in January 1999 that Iraq continues to hide documentation, and probably some equipment, relating to key aspects of past nuclear activities. After years of Iraqi denials, the IAEA was able to get Iraq to admit to a far more advanced nuclear weapons program and a project based on advanced uranium enrichment technology. However, Baghdad continues to withhold significant information about enrichment techniques, foreign procurement, and weapons design.
- The DCI Nonproliferation Center (NPC) reported in February 2000 and August 2000 that "We do not have any direct evidence that Iraq has used the period since Desert Fox to reconstitute its WMD programs, although given its past behavior, this type of activity must be regarded as likely. The United Nations assesses that Baghdad has the capability to reinitiate both its CW and BW programs within a few weeks to months, but without an inspection monitoring program, it is difficult to determine if Iraq has done so."
- Press reports in February 2000 claimed that Iraq might have developed biological warfare agents it had kept secret from UNSCOM inspectors and which were never discovered. The reports followed similar warnings by UNSCOM experts on January 25, 2000 that Iraq might have done so, that not all suspected biological weapons production and research facilities had been inspected, and that the undiscovered weapons might include infectious viral agents.vii

Copyright Anthony H. Cordesman, all rights reserved.

Digitized by Google

Original from
UNIVERSITY OF CALIFORNIA

- George Tenet, the Director of the CIA, testified before the Senate Foreign Relations Committee on March 20, 2000 and stated that, "We are concerned about the potential for states and terrorists to acquire plutonium, highly enriched uranium, and other fissile materials, and even complete nuclear weapons...Iran or Iraq could quickly advance their nuclear aspirations through covert acquisition of fissile material or relevant technology."

- A Department of Defense report in January 2001 stated that,

  - Despite these severe pressures on its economy, Saddam Hussein's government continues to devote Iraqi resources to rebuilding certain portions of its development program that was focused on building an implosion-type device. The program was linked to a ballistic missile project that was the intended delivery system. From April 1991 to December 1998, Iraqi nuclear aspirations were held in check by IAEA/ UNSCOM inspections and monitoring. All known weapons-grade fissile material was removed from the country.

  - Although Iraq claims that it destroyed all of the specific equipment and facilities useful for developing nuclear weapons, it still retains sufficient skilled and experienced scientists and engineers as well as weapons design information that could allow it to restart a weapons program.

  - Iraq would need five or more years and key foreign assistance to rebuild the infrastructure to enrich enough material for a nuclear weapon. This period would be substantially shortened should Baghdad successfully acquire fissile material from a foreign source.

- The CIA estimated in January 2002 that Baghdad had a crash program to develop a nuclear weapon for missile delivery in 1990, but coalition bombing and IAEA and UNSCOM activities significantly set back the effort. The Intelligence Community estimates that Iraq, unconstrained, would take several years to produce enough fissile material to make a weapon. Iraq has admitted to having biological and chemical weapons programs before the Gulf war and maintains those programs.

Source: Prepared by Anthony H. Cordesman, Arleigh A. Burke Chair in Strategy, CSIS.

Copyright Anthony H. Cordesman, all rights reserved.

Digitized by Google

Original from
UNIVERSITY OF CALIFORNIA

[i] National Intelligence Council, "Foreign Missile Developments and the Ballistic Missile Threat to the United States Through 2015, (September 1999 (www.cia.gov/cia/publications/nie/nie99). Also see the report of the Rumsfeld Commission, Commssion to Assess the Ballistic Missile Threat to the United States, Executive Summary, July 15, 1998, pp. 7.

[ii] CIA, August 10. 2000, Unclassified Report to Congress on the Acquisition of Technology Relating to Weapons of Mass Destruction and Advanced Conventional Munitions, 1 July Through 31 December 1999 internet edition.

[iii] New York Times, February 1, 2000.

[iv] London Sunday Times, February 21, 2000.

[v] London Sunday Times, February 21, 2000.

[vi] CIA, August 10, 2000, Unclassified Report to Congress on the Acquisition of Technology Relating to Weapons of Mass Destruction and Advanced Conventional Munitions, 1 July Through 31 December 1999 internet edition.

[vii] Associated Press, February 9, 2000, 0154; Washington Post, February 10, 2000, p. A-23; New York Times International, February 8, 2000.

Copyright Anthony H. Cordesman, all rights reserved.

Digitized by Google

Original from
UNIVERSITY OF CALIFORNIA

Senator LANDRIEU. Thank you very much.
Mr. Duelfer.

STATEMENT OF CHARLES A. DUELFER, VISITING RESIDENT SCHOLAR, CENTER FOR STRATEGIC AND INTERNATIONAL STUDIES

Mr. DUELFER. Thank you. I will try not to repeat many of the points that Tony made. I am in agreement with much of what he said. Let me begin by talking a little bit about the incentives that the regime has.

One of the aspects of UNSCOM's work in Iraq was to understand in detail the concept of use, the rationale, and the decisions which were taken to acquire these weapons. From the beginning, through our existence there, and until 1995, Iraq refused to describe those concepts, requirements, and so forth, the types of decisions that you and this committee take when you reflect upon the United States' defense programs.

But after Hussein Kamal, Saddam Hussein's son-in-law, defected in August 1995, all of a sudden Iraq became for a short period of time quite cooperative, largely because they were concerned that Hussein Kamal, who had been in charge of all these weapons programs, would spill the beans when he was in Jordan. In point of fact they were partially correct on that. In any case we had a very interesting meeting one evening where Iraq finally did discuss where these programs came from, who made the decisions, and why they were important to the regime.

As Tony has pointed out, in essence the regime believes it owes its survival to the possession of these weapons in a war with Iran. Iran was deploying human wave attacks on the southern front near Basra. Large numbers of Iranians would storm across the border, and Iraq could not defend against that except by using large numbers of chemical munitions. Iraq described to us that they consumed 101,000 chemical munitions. These were artillery rounds, aerial-delivered bombs and artillery rockets, filled mostly with sarin, but also mustard gas. So they used a lot. It saved the regime in that war.

More interestingly, however, I also explored with them the dynamics that weapons of mass destruction played in the second Gulf War. Again, they played a very important role. They were not used, but as in the Cold War they played a very important role.

You will recall that Secretary Baker met with Deputy Prime Minister Tariq Aziz in January 1991, before the war. One key point of his discussion was to warn the Iraqis and Tariq Aziz that, "if you use chemical or biological weapons, we will respond overwhelmingly, and it will be regime-ending." The Iraqis did not use these weapons even when they were losing, and I asked them why, and the long and the short of it was that Saddam thought that he would not survive. So the message worked. Saddam was deterred.

But at this meeting with very senior Iraqis, including ministers, they went on to describe how before the war they loaded not just aerial bombs but missile warheads with chemical agent and biological agent. They described the agents as aflatoxin, anthrax, bofullinim toxin, and nerve agents. They dispersed them to five locations. Warheads were at two and the aerial bombs were at three

Digitized by Google
Original from UNIVERSITY OF CALIFORNIA

others. Then they said they were predelegated the authority to use them under certain circumstances.

So I asked them "under what circumstances?" They said, "If the Americans went to Baghdad." They described the targeting, and then they added that it worked. The Americans did not go to Baghdad. So from the Iraqi perspective, the possession of these weapons saved the regime once again because it kept the Americans from going to Baghdad. It is not an illogical concept.

Of course, it was a monumentally depressing moment, as an inspector who is trying to get them to give up these things, because at that point I think it dawned on us that this was not just an uphill battle, it was an impossible battle. Tariq Aziz would regularly point out to us that "You are not General MacArthur. You did not occupy Iraq. Therefore, there are limits to what you can do."

They have a very refined sense of the use of force. They understand what an opponent is willing to pay and what it is not willing to pay. They understood that if we did not occupy Iraq, there were limits that the United States and the coalition were not going to go beyond, and that left us, the inspectors, out dangling. We were seeking to cause them to give up weapons which they considered vital to their national security. It was coercive disarmament, not arms control.

The Iraqi regime will often try to cause this to morph into an arms control discussion, which it is not. This is coercive disarmament. Iraq fought a war, they lost, and they are supposed to give up these weapons.

So I say all this by way of explaining just how important these capabilities are to the regime. They are not going to give them up, under any circumstances that I can imagine, without conflict. Certainly, as we learned in December 1998, they found that the price which the coalition and, in particular, the United States was willing to cause them to pay was worth it. In other words, they endured 4 days of bombing of some set of targets. That was fine by them. They got rid of the inspectors; they have the weapons.

Let me talk just very briefly about the missiles and other weapons which, in my judgment, remain. When we finished our work, there were a lot of unresolved issues. In the missile area, let me just summarily say that I suspect strongly that there is a strategic reserve of SCUD variant missiles left, on the order of a dozen or so. These are modified SCUD missiles which had been provided by the former Soviet Union, or produced in Iraq's own indigenous missile program. They had proceeded pretty far in getting a capability of building their own SCUD-like missiles.

In addition to that, they have been permitted by the UN resolutions to build missiles up to a range of 150 kilometers. As the Iraqis themselves have pointed out, the technology and skills required to make a missile go 150 kilometers are not terribly different from those required to make a missile go much further, so it was our judgment and our suspicion that embedded in the permitted program were activities to support longer range missiles. Certainly, we discovered the Iraqis had the desire for longer range missiles.

They had paper plans for missiles going as far as 3,000 kilometers. There was a program called the Al Abbas, which was a de-

Digitized by Google

Original from
UNIVERSITY OF CALIFORNIA

rivative of the SCUD technology and was planned to go 900 kilometers. My judgment would be that these development programs continue in earnest.

There are a couple of caveats on this—there were some technological hurdles they faced. One was guidance and one was some of the engine components, particularly turbines. Staging was a problem, and also—and this bears on the effectiveness of some of these weapons—warhead-fusing. The warheads which they deployed, the ones which they had predelegated the authority to use, were designed for impact-fusing. It's not a very efficient way of dispersing either chemical or biological agents. It might kill some people locally. It would certainly scare a lot of people, but in terms of causing a large number of deaths, that's not the best way. I think it would be wise to watch for any type of experiments with warhead-fusing in their ongoing program.

In the chemical program, the large uncertainty which we had at the end of our work in 1998 was over VX. Iraq denied that it had weaponized VX as an agent. This is a very advanced nerve agent. We found, to the contrary, that they had put VX in missile warheads. My guess is that they have the capability to deploy VX-armed artillery or bombs. We had unaccounted for precursors, the chemicals which you need to make the final agent. I think Iraq has the capability indigenously to produce sizeable amounts of chemical agent with strategic warning.

Chemical weapons in some ways are particularly useful in battlefield circumstances, as Iraq demonstrated in the Iran-Iraq War. But they are, I think, a manageable threat in a sense, so in some ways that is less of a problem.

The real problem that I see is in the biological area. We never got a full understanding of the program. Iraq had two major difficulties in trying to present a public and verifiable picture of what they did. One was the origin of the program. That was in the security services, and these were parts of the Iraqi Government that they did not want any light shown upon at all. Nevertheless, that is where these programs were born.

Second was the rationale and the purposes of these programs. They could not describe the purposes as military. It made no sense to produce an agent like aflatoxin. Aflatoxin is something which causes cancer over a period of years. The best military rationale is, it might prevent a lieutenant from becoming a colonel, but this made no sense whatsoever, especially when you look at some of the research and development efforts that Iraq conducted. They did things like mixing aflatoxin with CS, which is normally considered a riot control agent. Why would you do that? This infers a rather insidious mind set. In other words, are they developing a way of dispersing long-term lethal agents in ways that you will not know it.

They also examined agents for agricultural weapons, including wheat smut. So clearly they had a range of objectives, perhaps military, but perhaps much more insidious terrorism and other reasons for these weapons. We need to be looking out for that.

I would also comment on Senator Roberts' attention to agricultural weapons. Last year, there was this terrible foot and mouth disease outbreak in the U.K. and I think it is highly illustrative of

Digitized by Google
Original from UNIVERSITY OF CALIFORNIA

how effective an agricultural weapon could be. This case appears to be caused by some pig from South Africa or something. There is no reason to believe that it was caused by a country, but it is illustrative of something that could easily be caused by a country—and we might not know it.

Finally, I want to make a couple of comments about the Iraqi nuclear program, and where it may be headed. The nuclear program fortunately was never achieved by the Iraqis. In spite of a lot of effort, resources, and thousands of people devoted to it, they did not get a weapon. They had a good design. They almost got a weapon, but they did not.

Towards the end of our work, we were looking around to see where some of the key people that were involved in the nuclear program were located. They were reemerging in clusters. They were clustering in areas where they had similar expertise, at state establishments and key defense factories. It appeared to us not coincidental. In other words, it appeared that the nuclear team was reassembling from 1998 onward.

Now, how far they are going and how far they have gotten is an open question. There is some limited reporting by defectors, some of whom have gone public, that the program continues. Similarly, there is defector reporting in each of the other areas which confirms that these programs are continuing and weapons exist, and that the nuclear program is the biggest risk, but fortunately is also unlikely to be achieved in the short term.

On Iraqis who leave Iraq, it seems to me the United States has not done as good a job as it could have towards encouraging brain drain. Ultimately, it is the people who make the weapons, and ultimately it is the expertise that we at UNSCOM left behind. These are technocrats—smart, energetic people. In many cases, they are trapped in the system. They face daily dilemmas that we do not. Do you risk leaving? Do you risk not serving the regime? Risk your life? Risk your family's life? These are daily decisions these people confront, and they have a lot of sympathy from me, despite the fact that they may participate in these programs.

I think we could do a lot both to help them and to help ourselves by encouraging them to vote with their feet. As it becomes more and more clear that the United States is serious about changing the regime in Baghdad, Baghdad is going to get pretty ugly. Saddam's a proactive guy. He may be paranoid. He may have good reason for being paranoid. People are going to be starting to look next to him and saying, who is likely to be disloyal? People are going to die. I would hope some of these more productive Iraqis will decide sooner to leave rather than later, and perhaps we can make that message clear.

This plays into a final point. If we do confront Iraq militarily we face another issue where Saddam may actually order the use of these weapons. Deterring him this time may be difficult because he may realize that we are not going to stop until he is gone, period.

That takes away some of the leverage on deterrence, so in that case, one of the messages you may wish to transmit is to all the people who have to execute the orders and say, look, there will be a new regime. Judgments will be made at that point in time, and your actions now will be evaluated at that point in time. Iraqis in

Digitized by Google

Original from
UNIVERSITY OF CALIFORNIA

the chain of command must think about it, because we will be watching to see who actually does this and who does not do it. Maybe the people can be deterred, if not their leader.

Those are my comments. Thank you very much.

[The prepared statement of Mr. Duelfer follows:]

PREPARED STATEMENT BY CHARLES A. DUELFER

Thank you for the opportunity to appear before your subcommittee. I would like to make my presentation in two parts. The first part will address the motivations, concepts, and organizations supporting the Iraqi WMD programs. The second will discuss the ensuing programs and their probable status today.

UNSCOM had long pressed Iraq to provide information and documents describing the requirements and operational concepts for the biological, chemical, ballistic missile, and nuclear programs. Iraq refused until shortly after Saddam Hussein's son-in-law, Hussein Kamal, defected to Jordan in August 1995. Hussein Kamal was the most senior regime official with control over these weapons programs. Baghdad was concerned about what Kamal would reveal and sought to limit the damage by a burst of controlled cooperation and admissions.

On September 18, 1995, I had a long, late night meeting with several senior Iraqi ministers and other officials. The meeting was arranged to discuss the Iraqi concepts and requirements for their WMD development and production programs. Previously, Baghdad had refused to engage in such a discussion. I remember the meeting quite well, not simply because there was an unusual amount of candor, but because I suddenly realized how unlikely it was that the government would ever comply fully with the UN demand to completely give up all WMD capabilities forever. Consequently, the UNSCOM inspectors had an ultimately hopeless task under the conditions they were permitted to operate.

Iraq revealed that evening how weapons of mass destruction were viewed from the position of the presidency. (They even provided selected presidential documents.) Partial descriptions of the origin of WMD efforts were discussed. They also discussed how these programs had been used and their importance to the regime. In essence, the possession of WMD had saved the regime on two occasions. The first was in the war with Iran in the 1980s when Iranian human wave infantry attacks were repelled with chemical munitions (UNSCOM learned that 101,000 were reported "consumed" during this period).

The second instance where WMD preserved the regime was more surprising. I had asked about the decision by the Iraqi leadership not to employ WMD in the 1991 Gulf War. In a carefully worded response, the impression was conveyed that the president thought if Iraq used chemical or biological weapons against the coalition, retaliation would end his regime and probably him personally. He was successfully deterred. However, my interlocutors went on to describe how they had loaded biological and chemical agent into various missile warheads and bombs before hostilities began in 1991. Moreover they dispersed these weapons and pre-delegated the authority to use them if the United States moved on Baghdad. The Iraqis stated that these actions apparently deterred the United States from going to Baghdad.

Whether the Iraqi leadership believes this was the only reason the United States did not go to Baghdad in 1991 is unknown. However, clearly they are convinced that the possession of WMD contributed to keeping the Americans away and thus was vital to their survival.

The Iraqi WMD programs, which were begun in the mid-1970s, and consumed large material and human resources throughout the 1980s, were well worth the investment from the perspective of the leadership. It was difficult then and more difficult now, to imagine circumstances under which this regime would end these programs. Deputy Prime Minister Tariq Aziz said on more than one occasion, "You are not McArthur. You did not occupy Iraq. Therefore, there are limits to what you can do." He was absolutely correct. Inspectors would be inherently limited in what they could do and accomplish. Nevertheless, we did eventually obtain a pretty good picture of the extent of Iraq's programs. From that, and from evidence that continues to be available even now, it is possible to make a reasonable judgment about Iraq's current capabilities and intentions.

Organizations. The key organizations of the Iraqi programs included not just the Ministry of Defense, military services and Military Industrial Corporation, but also the intelligence services. The role of the latter was particularly relevant to the biological weapons program and contributed to our lack of understanding in that area. The military services had clear roles in the chemical area. Air forces and army forces stocked and used a variety of munitions for battlefield purposes. The long-

Digitized by Google

Original from
UNIVERSITY OF CALIFORNIA

range missiles were in a separate unit and had special warheads that could be loaded with chemical or biological agents. The Military Industrial Corporation (or organization) was and is now the ministry that coordinates all military research, development, and production. A special department of the Iraqi Intelligence Service or Mukhabarat plays an important supporting role, especially in arranging overseas procurement of weapons-related items. They coordinate purchasing missions and establish front companies or work through companies who conduct largely legitimate business.

The Special Security Organization (Amn al Khass) had a special role in the biological weapons program that was carefully concealed. UNSCOM only obtained fragmentary information on this but it was clear that much of the original work on agent development was at the instigation of this security organization. The purposes of such research were therefore uncertain, but not related to military requirements. The Special Security Organization and the elite military units of the Special Republican Guard are responsible for protecting and concealing WMD elements.

The place where all these programs came together was in the Office of the President (or Diwan). Only top presidential advisors had the full picture and gave direction and committed the resources to these programs. Key among them is Presidential Secretary Abid Hamoud who plays a role like the U.S. national security advisor, but more so. (He has more command authority.)

Incidentally, the reason UNSCOM pressed so hard to gain access to presidential sites, including palace areas, was because this is where we believed we could find the program and planning data that would allow us to verify the full extent of the Iraqi programs. The top-level control of these programs will not have changed today.

Long Range Ballistic Missile Status. The bulk of Iraq's long range surface to surface missiles derived from imported SCUDs from the former Soviet Union. They imported 819 missiles and 11 mobile launchers. Many were expended: against Iran, for testing, and in the 1991 war. Iraq unilaterally destroyed others in an elaborate ruse to preserve a limited force in 1991. UNSCOM pursued a long and tortuous process to account for these missiles, which was made more difficult by the discovery in 1995 that Iraq had a program to produce such missiles indigenously. This program was at least somewhat successful. At the end of our work in Iraq there remained uncertainty over the disposition of a relatively small number of SCUD missiles. In my view it is likely Iraq retains a small long range missile force (perhaps 12–14 missiles) that would serve the purpose of a strategic reserve.

However, Iraq also retained a missile development and production infrastructure. This is permitted under UN resolutions for missiles up to 150 kilometers. Iraq has an active development program for a liquid fueled missile dubbed the al Samoud, which utilizes engine technology from the anti-aircraft missile SA–2 (Iraq had over 1,400 of these missiles) and some technology derived from its SCUD missiles. This program continues today and there are reports that Iraq may be seeking the ability to extend its range and develop longer-range missiles.

Key areas Iraq needed to work on included warhead fusing (their chemical/biological missile warheads in 1991 had impact fuses which would greatly limit their effectiveness), guidance, and engine production. Another area where Iraq is undoubtedly working is on staging. The Iraqi surface to surface missiles in 1991 were single staged. However, they were doing research on ways to add stages and increase range. It should be noted that Iraq continued these research and development efforts even while UNSCOM was inspecting during the early 1990s.

Chemical Weapons Status. While UNSCOM attempted to obtain documentation covering missions and requirements from the Ministry of Defense we never succeeded—despite some very intrusive inspections.[1] Nevertheless, we gained a general picture of the chemical weapons programs up until 1988, or the end of the Iran-Iraq war. The agents and munitions developed and used were nerve and mustard agent. They had clear battlefield applications and we were able to account for much of the weapons and production capacity. Remaining issues included such matters as discrepancies about munitions consumed. (A key document found by UNSCOM in the Iraqi Air Force headquarters in July 1998 was seized back by Iraq. Inspectors had copied the data, which contradicted earlier Iraqi declarations accounting for nerve and mustard munitions.) There also was production equipment for which UNSCOM had evidence that it existed in Iraq, but never located. There also was no way of verifying the disposition of much of the stocks of precursor chemicals Iraq had acquired.

It was certainly the case that the work Iraq pursued in chemical weapons after 1988 was the most tightly protected by Iraq. The one Ministry of Defense document

[1] There was one exception—a Ministry of Defense document directing acquisition of chemical weapons agent in 1988.

Digitized by Google

Original from
UNIVERSITY OF CALIFORNIA

UNSCOM did receive provided guidance to continue to develop types of chemical weapons, attempting to manufacture the most dangerous types in large quantities. It was in this period that development and production of the advanced nerve agent VX was conducted. There remains considerable uncertainty about the extent of this program and its disposition. There was a pattern to Iraqi revelations—they gave up the oldest and least advanced projects and materials most readily.

UNSCOM accounted for and destroyed huge amounts of chemical agent, munitions, production equipment, and precursors. Yet, there certainly remained unaccounted materials for the production of both precursors and final agent. Iraq can make munitions indigenously and can probably make needed chemical production equipment indigenously. The expertise for such work remains.

Areas where Iraq could be expected to be doing development would be in producing stabilized VX and improving their munitions and dispersal systems. In particular, the aerial bomb designs Iraq had in the early 1990s were not efficient for dispersing nerve agent. Fusing was a problem. It was apparent that Iraq was beginning to look into cluster munitions. Such munitions could be much more effective battlefield weapons. Aerial spray devices, possibly attached to remotely piloted vehicles, were under development and had application for both chemical and biological agents.

Biological Weapons Status. The biological weapons program was the least well verified of all Iraq's WMD programs. Part of the reason is because, as noted earlier, it emerged from the security organizations. The original purposes probably were not military in nature. This program was also not admitted until 1995, or 4 years after UNSCOM began work in Iraq. We know that the biological weapons program largely shared the same munitions as chemical weapons. However, the production levels and disposition of both agent and production equipment has significant uncertainty.

The three biological agents Iraq states it produced for weapons were anthrax, botulinum toxin, and aflatoxin. There were many other biological agents on which Iraq conducted research and development. These included clostridium perfringens (causes gangrene), ricin, wheat cover smut, and some early work on viruses. Iraq had begun some early genetic engineering work as well. Iraq conducted experiments mixing lethal and non-lethal agents such as CS, commonly used as a riot control agent.

Iraq never made clear the purposes of many of these programs and experiments, extensive though they were. It seemed probable that military use was not the only purpose. In fact, the military seemed to have almost no interest or relationship to the program. It is difficult to understand why Iraq would produce and put alatoxin into aerial bombs. It has the effect of causing cancer over a period of several years. Experiments Iraq conducted in mixing aflatoxin with riot control agent appear particularly insidious as they would mask the exposure of individuals to this cancer causing agent.

The experiments with wheat smut are evidently aimed at developing economic weapons.

It was clear that Iraq understood that depending on the method of dispersal, the origin of the agent could be concealed. In other words, they understood the potential for conducting an attack that would be near impossible to connect to Baghdad as the responsible actor.

The sites where Iraqi biological weapons work was known to have occurred were accounted for by UNSCOM. The largest, al Hakam, was destroyed under UNSCOM supervision in 1996. Another, the Daura Foot and Mouth disease facility, is being used for civilian purposes according to public accounts. There were elements of production equipment that UNSCOM understood were shipped into Iraq, but which were never located.

Nuclear Weapons Status. The nuclear weapons program is the most critical and most difficult for Iraq to achieve. While successful in all other WMD areas, Iraq did not quite achieve a nuclear weapon capability before invading Kuwait. Iraq had a huge sustained investment in nuclear weapons development throughout the 1980s. The International Atomic Energy Agency (IAEA) accounted for most of the program and key facilities were destroyed. However, the intellectual capital remains, as does the will of the leadership to achieve a nuclear capability. Even during the time UNSCOM and IAEA were still in Iraq, there was a pattern of the former staff of the nuclear program being reassembled in common locations according to their expertise, e.g. specialists from former centrifuge enrichment program can be found clustered at one facility. Of course Iraq claimed they were engaged in activities allowed by the UN resolutions, but coincidences like these occurred too often.

Key facilities where personnel congregated included Al Majd Center, the Ibn Sina Center, Al Raya Center, Sa'ad Center (right across from the Rasheed Hotel familiar to all visitors), and the Al Tahaddi Center. These centers have legitimate rationales

Digitized by Google
Original from UNIVERSITY OF CALIFORNIA

for their on-going work, but the presence of teams of alumni from the nuclear weapons program is a key tip-off.

A recent defector who worked as a design engineer (evidently in the Al Majd Center) stated that an explicit order to reconstitute the nuclear teams was promulgated in August 1998, at the time Iraq ceased cooperation with UNSCOM and IAEA.[2]

The key hurdle for Iraq to surmount to obtain a nuclear weapon is the acquisition of fissile material. Iraq had a viable weapon design and the capacity to produce all the elements of a weapon. Predictions on when Iraq will achieve a weapon depend on whether Iraq can obtain fissile material by smuggling or they have to produce it themselves, which will take much longer. Predictions are particularly uncertain. The German intelligence authorities made an oft-quoted estimate last year in which it was stated that Iraq could, in the worst case, have a nuclear weapon in 3–6 years. German intelligence noted the growth in Iraqi procurement efforts in particular for weapons-related items.[3] However, how this projection was made is not public and it may include significant uncertainty.

While precise estimates of the Iraqi nuclear program are impossible, what is certain is that Baghdad has the desire, the talent, and the resources to build a nuclear weapon given the time to do so.

Where are they headed? Typically, the regime in Baghdad will devote full resources to its weapons programs. All evidence suggests this has not changed even under sanctions and while the Iraqi civil society has been decaying. The regime has ruthlessly used a combination of reward and punishment to achieve all of its objectives, whether protecting itself internally or expanding its influence internationally. The use of force comes naturally and weapons of mass destruction are a vital element of the spectrum of power the regime applies. The regime exhibits a fundamental view that if you are not feared, you are nothing.

The regime seeks to dominate the region. It generates fear in its neighbors but also has the inherent capacity to reward them due to its oil wealth. It has skillfully played these two levers. Its influence in the region has steadily and incrementally grown since the debacle of 1991.

The Current and Future WMD Threat. Iraq has significant WMD capabilities in all areas with the exception of nuclear. It is probable that a small force of SCUD derived missiles remain in Iraq. Defectors have reported their existence and this is consistent with the remaining uncertainties of UNSCOM's work.[4] Moreover, the ongoing Al Samoud liquid propellant missile is proceeding quite actively. Iraq has also been active in developing solid propellant engines. Iraq had a project called Badr 2000 which aimed to import non-SCUD missile technology. UNSCOM eliminated much of this program, but it embodied an objective Iraq retained in its missile programs—a multi-stage surface to surface missile. It is a reasonable assumption that such development work continues. Even during the time UNSCOM was in Iraq, a facility for the production of ammonium perchlorate, a key ingredient in solid missile propellent, had been established (to eliminate the need to smuggle such material).

Key things to look for in the Iraqi missile program will be testing of separating warheads, fusing for detonation above ground, and perhaps employment of supersonic parachutes to retard warheads. Evidence of Iraqi interest in these areas before UNSCOM left and such testing would indicate important advances in chemical and biological missile warheads.

The chemical weapons program must be assumed to remain albeit in a diminished state from the huge industrial production of the 1980s. Dual-use facilities, even at known locations such as the production plants at Falluja, have the ability to produce chemical agents clandestinely. Chemical weapons have proven utility to Iraq on the battlefield against large troop concentrations. Iraq will retain the capacity to produce significant amounts of agent and fill munitions in a period of strategic warning. Storable, persistent VX agent may well have been produced since

---

[2] London Sunday Times of December 24, 2000, "Saddam Builds New Atom Bomb," by Marie Colvin (who interviewed engineer Salman Yassin Zweir in Amman Jordan.) Another defector associated with the nuclear program went to Spain in 2000 and also reported ongoing work. See Il Mundo, Sunday, April 2, 2000. A more sensational report from a defector carried in the London Sunday Telegraph of January 28, 2001 that Iraq has two nuclear weapons is extremely dubious. Major elements of his descriptions (some on television) were demonstrably wrong—such as an underground facility at Lake Rezzaza. Moreover, when Saddam does have a bomb, his behavior will change.

[3] As reported in Die Welt internet version of February 23, 2001, "The Long Arm of Saddam" by Roland Nelles.

[4] Another defector interviewed in Jordan and reported in London Sunday Times of February 20, 2000 in an article by Marie Colvin and Uzi Mahnaimi. The defector reported training exercises with missiles including the loading of warheads with nerve agent.

Digitized by Google

Original from
UNIVERSITY OF CALIFORNIA

UNSCOM left in 1998. Chemical weapons munitions for the battlefield can be produced in existing Iraqi munition factories.

The biological program is the most problematic for a number of reasons. First, it is the least visible. Facilities can be hidden or made mobile. UNSCOM had received reports of mobile biological weapons facilities. Unlike nuclear programs, biological weapons programs have a small signature. The best window into the Iraqi program will be from defectors. Some have been providing such information.[5] Another key concern about the biological programs is that Iraq can accomplish everything indigenously. They can produce all the production equipment (fermenters, dryers, centrifuges, etc.). Iraq is also quite able to produce dispersal weapons of various sorts. Finally, they have access to seed stocks for a whole range agents.

The types of research Iraq is known to have conducted points to their interest in biological weapons not just as a battlefield weapon, but as a strategic weapon, an economic weapon, a terror weapon, and possibly a genocide weapon. It remains to be learned precisely what agents were used in Kurdistan and whether they were strictly chemical agents.

Biological weapons are the most difficult present threat posed by Iraq. They certainly have the capacity to deploy it clandestinely or through surrogates should the regime so decide. Moreover, it is possible that such things as wheat smut could be spread without any way of tracing the source. It is not impossible to imagine an economic disaster like the British foot and mouth disease outbreak that could be secretly directed from Baghdad and we would never be able to prove the source.

Biological weapons remain a high priority for the regime. Defector information indicates recruitment efforts among top Baghdad University biology students. It is also interesting to note that people associated with the biological weapons programs have been promoted. One key individual is now deputy director of the Military Industrial Corporation—the state run defense research, development, and production center.

Saddam Hussein has stated his policy on weapons himself. In a televised meeting with top officials of the Military Industrial Corporation on June 12, 2000, he said,

> "If the world tells us to abandon all our weapons and keep only swords, we will do that. We will destroy all the weapons, if they destroy their weapons. But if they keep a rifle and then tell me that I have the right to possess only a sword, then we would say no. As long as the rifle has become a means to defend our country against anybody who may have designs against it, then we will try our best to acquire the rifle."[6]

Finally, and most recently, the official newspaper of the Iraqi Bath party, Ath-Thawra, wrote that "Acquiescing to Israel's, but not Arab, possession of such weapons (WMD) is a case of double standards. But no matter how much those who pursue double standards try to obstruct the Arabs, they will not stop their efforts to achieve this goal, be they overt or covert, in future. Acquiring weapons of mass destruction is consistent with "the right to self-defense and the requirements of national security, irrespective of the nature of a ruling regime."[7]

Of course, the difference in the regime is everything. The present regime in Baghdad will not give up WMD even if inspectors go in again. The present regime will also remain quite willing to use them.

Senator LANDRIEU. Thank you very much. Those were excellent summaries of your testimony, and I think you have really given us a tremendous amount of food for thought, and there will be questions, of course. We will proceed with 6 minute rounds, our usual procedure.

Let me begin, Dr. Cordesman, with trying to revisit an issue for just a moment. I agree that we have probably spent too much time focusing on missiles as a method of delivery. Although I have supported some of the development of our programs here in the United

---

[5] One of the better known was Abbas al Janabi who left in February 1998. He was a close aid to Saddam's elder son, Udey. He reported that the effectiveness of UNSCOM was limited and, in particular, Iraq retained a biological weapons capability. See Paris Match February 11, 1999 pp. 3–5.

[6] From a FBIS report 122115Z of June 12, 2000.

[7] From an Agence France Press wire report from Baghdad of January 20, 2002, describing a report in Ath-Thawra of the same date.

Digitized by Google
Original from UNIVERSITY OF CALIFORNIA

States, I do think that we need to focus on other delivery systems that you mentioned.

Could you go into some more detail about what kinds of systems you think would be more likely to be used, what you may be looking for, and what the effective means of delivering these other types of weapons that we should be more focused on are?

Dr. CORDESMAN. Senator, I think you have two basic categories of delivery. One is if you are using an alternative military weapons system, another is if you are using a covert delivery system.

I would agree with Charles that a nuclear device, if they have one, in the near term is likely to be large, bulky, and difficult to deliver, and almost a last resort device. It is also not clear that they can test. It is not clear that they have enough fissile material for such a test.

If, however, they have moved ahead with dry storable biological weapons and crop sprayers, they could use MIG–21s as drones. You can take an aircraft and modify it to spray biological agents. The question would be how many would penetrate, but some might well penetrate. You could find ways to use helicopters. Iraq used helicopters to deliver chemical weapons during the Iran-Iraq war. Helicopters operating quickly across borders against an area like Kuwait, for example, and disseminating biological weapons at night, would be a scenario that would particularly concern me.

Covert weapons are a different category. The Gulf, frankly, is a very porous place. Anybody who has actually been to the Gulf and gone to Gulf ports is aware that security is often extraordinarily nominal. For example, the port of Dubai has virtually no day-to-day inspection or surveillance. There is a lot of small traffic across the Gulf. Smuggling a weapon into a southern Gulf country, a place where the U.S. might have to disembark forces, would be another scenario. Even for a country like Israel it would be very difficult to close its borders against such covert attacks.

If you were to take the worst case scenario, it would be that Iraq does indeed have smallpox, and they would disseminate that in a place like the Frankfurt Airport. You really do not have to be subtle in making such attacks. You do not have to have an attack spread over many locations. The infection corridors disseminating smallpox from an attack on one airport over the course of a single day, particularly one with a lot of flights to the United States, as well as to Europe, would be something where——

Senator LANDRIEU. It would be a very effective delivery system.

Dr. CORDESMAN. More than that, it would be almost uncontrollable and make it almost impossible to predict how the infection patterns would develop. Again, these are worst-case scenarios. We had the real world case of Aum Shin Rikyo using anthrax spray on innocent civilians and the agent was so ineffective they never noticed they were being sprayed.

But let me make the point that while missiles are not the only delivery system, I would not disregard them. As Charles pointed out, firing one crude chemical or biological warhead into the area of downtown Tel Aviv might be a way of catalyzing a region-wide war and Iraq might do this if it felt that this was its last way of levering this conflict and the regime was threatened.

Senator LANDRIEU. Mr. Duelfer, do you have anything to add?

Digitized by Google

Original from
UNIVERSITY OF CALIFORNIA

Mr. DUELFER. I think that covers the waterfront. I could go into more detail. Iraq did develop helicopter-mounted devices for the dispersal of biological weapons. There was a fellow named Zubeidi, and a device which we called the Zubeidi device in his honor, which was specifically designed for that purpose. So they clearly have a notion of using aerial dispersal methods.

They had also been doing some work with a Czech trainer aircraft called the L–29. When we were in Iraq we explored that issue with them and they, of course, said this was simply an RPV, a remotely piloted vehicle, but it would make a very good platform for dispersal of biological agent.

Senator LANDRIEU. Let me ask you both this. Given your keen understanding, since you both have a lot of expertise in dealing with this particular regime and the motives of this regime, could you both give your views on the likelihood of Iraq perpetrating an attack against the United States with chemical or biological weapons, either itself or through terrorist properties?

A lot of your testimony has been about Iraq's motivations towards its neighbors, protecting itself against invasion. Post September 11, knowing now what we know about their operation, which has really been without inspection for 10 years—but where we have a sense of their capabilities, etcetera, could you just for the record give your views of that likelihood, particularly through terrorist proxies? Is that likely or unlikely, and how would you back up your conclusions and suggestions?

Dr. CORDESMAN. Let me begin. I think, frankly, Senator, that nobody can really answer that question by providing clear probabilities. Over the years, Iraq has done a far better job of terrorizing its own citizens, both domestically and abroad, than exploiting terrorist groups.

Terrorist groups are very divided. For all the talk of Islamic extremism, many of them are secular, many of them change alignments very quickly, and many of them quite frankly are for sale. The ability to use one such group with limited risk of attribution is something that any country in this region is at least potentially capable of.

My guess would be, however, that Iraq would not do that. It would be too frightened of the United States eventually finding out what happened, and of it triggering the level of U.S. military action to remove the regime that they know they could not resist.

But the other answer to your question is, what happens if Saddam Hussein feels he is on the edge of defeat, or that his regime is likely to be destroyed? I think he basically sees himself as the future of the Iraqi nation, and I think he would be more than willing to take virtually any kind of revenge that he could take, and to use a terrorist group to deliver any weapon he could bring to bear against the United States.

Senator LANDRIEU. Mr. Duelfer?

Mr. DUELFER. I would just add a couple of observations. I spent a lot of hours talking with senior Iraqis, and they looked at me as the one senior American they could actually talk to over the years. It was interesting, because they really wanted to be reconnected to the West. They wanted to be reconnected to Washington. It was not that they were trying to defeat the United States, and I do not

Digitized by Google
Original from UNIVERSITY OF CALIFORNIA

think that that is Saddam's objective. Saddam's objective is to promote himself and to promote himself as the leader of Iraq, so it is not akin to Osama bin Laden, where there is this ideological objective of destroying the capitalist West. That is not the case at all.

However, as Tony points out, if Saddam feels that we are threatening his existence, he may decide to take as many people as possible down with him, but I do not think that he would have cause to support a terrorist objective for the purpose of trying to destabilize the United States, for example.

I would not put it past him to support the terrorist organizations. I would be astonished if there were not connections between the Iraqi intelligence services and al Qaeda, and I think the more some of our government colleagues poke through the caves in Afghanistan I would not be surprised at all if we see that there were Iraqis in some ways present, mainly for the purposes of sharing perhaps skills and funding, but not for the purposes of attacking the United States.

They would, however, I think share an objective with Osama bin Laden in terms of going after the Saudis, and in essence I had this conversation with the Iraqis, because they see themselves as the rightful predominant power in the region. They think the Saudis do not deserve to be the leader in the region, particularly the leader in OPEC. They see themselves as having that position, and if they were successful in knocking a few blocks from under the Saudi regime, the United States—for reasons of economics and oil—would be forced to deal with Baghdad, and that was a lever they were going to pursue.

Senator LANDRIEU. My time has expired.

Senator Bingaman.

Senator BINGAMAN. Thank you both very much. Thank you, Madam Chairwoman, for holding the hearing. There is a growing drumbeat here in Washington in particular for military action against Iraq, and I think it is hard to watch a talk show or read a newspaper without reading about it. It is coming from some within the administration and from some in Congress. It is coming from various people in the media.

From what I am picking up from the testimony of both of you, clearly there seems to be agreement that Iraq is continuing to pursue development of weapons of mass destruction, continuing to pursue capabilities to deliver those weapons as they determine, or as Saddam determines is appropriate, and that they are not going to give those up without a conflict. I think, Mr. Duelfer, you said that, and I have no reason to doubt that.

I guess my question is, do the facts you have given us so far lead you then to a conclusion about whether it is in our national interest to proceed with some kind of military action against Iraq, or does it lead you to the opposite conclusion. Does it lead you to a conclusion that we should pursue some other set of options?

Dr. CORDESMAN. I do not think you can get a simple answer to that question. There are some other options that might work, like a true covert overthrow option, and I do not mean by this the support of any of the three opposition groups that exist today. I mean, actually trying a major covert operation within Iraq. Such an effort

Digitized by Google
Original from UNIVERSITY OF CALIFORNIA

would not trigger an immediate Iraqi reaction, and it could be a duel that lasted for years, if not a decade.

There are options which I would regard as being very dangerous for other reasons. These include relying on a weak, if not impotent, opposition movement like the INC, praying that you got a repetition of Afghanistan, starting something we cannot not finish, and then creating a "Bay of Kurdistan" and embarrassing the United States throughout this region by a conspicuous failure. The only thing worse, quite frankly, than Saddam is for the U.S. to try to overthrow him and still have Saddam.

If you are going to draw the conclusion from his weapons of mass destruction that we must strike, the follow-on conclusion must be that if we are going to do something militarily, it has to be quick, it has to be decisive, it has to be thorough, and it has to have an American presence on the ground. It has to be followed up by a major effort to rebuild Iraq, to create a state that the Iraqi people deserve. The Iraqi people, frankly, are often a remarkably decent group of people.

If we meet these conditions, we are willing to use several air wings and the equivalent of a heavy corps so this can be done in a matter of weeks, and if we can get the support of nations like Turkey, Kuwait, and hopefully Saudi Arabia, then the threat of proliferation here is so dangerous that that would be an option which I would say would be justified.

But if it is the U.S. supporting the INC in fumbling its way into defeat, or if it is simply another set of air strikes, if Saddam survives, if Iraq goes on and proliferates, and we then convince everyone in the region that the U.S. has tried and failed, that would be a disaster.

Senator BINGAMAN. Mr. Duelfer, did you wish to give an opinion?

Mr. DUELFER. I would say a couple of things. One is there are two alternative futures. One is an Iraq under the current regime, which continues to develop its WMD capabilities, ultimately resulting in a nuclear weapon. They are going to have 4 or 5 million barrels of oil production a day in the not-too-distant future, and a willingness to use this power. That is one future.

The alternative future is an Iraq under a government that behaves according to international norms, with whom we can have relations, with a vibrant, developing society, with, again, the production of oil, agriculture, and a population which is secular, westward-leaning, who want nothing more than to be reattached to the West. They would love to have the Internet. They would love to have fax machines. They would love to have satellite TV. The difference between those two futures is huge, and a positive Iraq can change everything in the region. To me, that is worth taking some risk.

I agree with Tony that it is going to require a strong American presence, because one of the artifacts of American policy in the past 10 years is that people do not believe us. Sending a few cruise missiles does not mean anything. The Iraqis have grown to like cruise missiles. I had conversations with them on this topic. They said, "well, why do you do this, you target buildings." I said, "well, we have these pictures, so we target the buildings." Buildings to them are like scotch tape. They do not care.

Digitized by Google

Original from
UNIVERSITY OF CALIFORNIA

So they are used to America not being serious, but if America demonstrates that it is serious, it will change people's minds in Iraq. They will question, are they going to fight to defend this regime, or are they going to say, "here comes the future." Similarly, our European friends and allies and the countries in the region will begin to think about what position they want to be in with the next regime, which will be quite positive.

It is a tough decision.

Senator BINGAMAN. I guess I am still unclear. Is it your view, Dr. Cordesman, that we could accomplish the objective that both of you are referring to here, changing the regime in Iraq, in a quick, decisive way?

Dr. CORDESMAN. It depends upon what you mean by quick and decisive. I think it would be disastrous to go into this region today, not having established the credibility of what we intend to do with our regional allies, not having proven that this time we are truly serious and have a high chance of success, and not having shown we have a clear plan for what we are going to do in Iraq after we win.

Now, we cannot take these steps tomorrow. It probably could be done in a year, perhaps less. It would require a very clear U.S. commitment, however, to act decisively and to use a great deal of our political influence. Our efforts would also be complicated by the second intifada. But, I think within a year it is at least possible, although I would prefer a year to 18 months if we had the time.

I do think—I want to be very clear about this—that the people who talk about Iraq being another Afghanistan are kidding themselves. Those who feel the INA and INC, with their almost massive penetration by Iraqi intelligence and their acute weakness, or the Iranian-backed SARI, with its ability to conduct a few minor raids but no troops, plus a few air strikes, can give us a quick overthrow capability believe in a dangerous myth. Acting on it would do us far more harm than good.

Mr. DUELFER. Two quick comments. One, it requires U.S. forces on the ground. We have to convince the regular Iraqi Army that we are serious about regime change. There are institutions in Iraq that we want in the next government anyway, such as the regular army and the regular civil service.

The second point is, on rebuilding Iraq, that it is vastly different than Afghanistan. The Iraqis will rebuild Iraq lickety-split. In 1992 they had their communications and a lot of the essential services back. These guys will take care of themselves, once they have the opportunity.

Senator BINGAMAN. Thank you.

Senator LANDRIEU. Senator Hutchinson.

Senator HUTCHINSON. Madam Chairwoman, thank you for holding the hearing today, and thank you for what I think is very chilling testimony. What you have told us today justifies the President's characterization of Iraq as part of an axis of evil, at least in my estimation. My only question about the President's use of the term "axis of evil" is why there were not some other nations included in that axis as well that are either terrorist states or exporting terrorism and weapons of mass destruction.

Digitized by Google

Original from UNIVERSITY OF CALIFORNIA

I thank you for your very candid and forthright testimony. It is needed as a part of a wake-up call for the price that is going to be required and the commitment that is going to be necessary to do what you have, under various scenarios, suggested.

I just came back from Afghanistan, Pakistan, and Uzbekistan, and we stopped in Brussels and met with our NATO commander. One of the things that struck me in particular in the visit with NATO was the skittishness of our European allies that have been forthrightly foursquare behind our effort in Afghanistan but are very, if not outright, opposed to—very nervous about—any expansion of the war on terrorism beyond Afghanistan. Part of their point, or part of the contention they make, is that there is no evidence that Iraq exports. That Iraq, while it may be developing weapons of mass destruction, is not sharing or proliferating those weapons with others.

In your testimony, if I heard correctly, Mr. Duelfer, you suggested that you would not be surprised if we found evidence of Iraqi connections with al Qaeda in those caves in Afghanistan, and that at least those connections, those communications, I think you made a distinction between their goal being the destruction of, or the undermining, of Saudi Arabia, but not necessarily an attack upon the United States.

It seems to me that if you are going to communicate with and share intelligence and information with al Qaeda, whatever your motive is, the end result is going to be that you are assisting an enemy of the United States. Maybe if you could just respond a little bit to the issue of whether Iraq is in fact proliferating and sharing its WMD technology with others.

Mr. DUELFER. When we were in Iraq as UNSCOM we did not see conclusive evidence that Iraq was sharing its WMD expertise with other nations. They, of course, were obtaining WMD expertise from other nations.

There were some indications that Iraqis who had WMD expertise were traveling abroad. I am sure the Iraqis would simply say, they were probably just taking vacations in these countries. This is very suspicious, but in terms of absolute facts, I cannot tell you that Iraq was sharing its capabilities with other countries, or non-state actors. Having said that, there certainly were lots of what we would call terrorist groups hanging out in Iraq.

We inspected a couple of bases there to see if they were concealing weapons. There were lots of places and activities we stumbled across not related to our mandate under the UN, but which would indicate there certainly were connections between the Iraqi intelligence services and some of these terrorist organizations, but I cannot tell you that there was a WMD connection.

We had enormous access in Iraq. We inspected Mukhabarat headquarters, the elite Special Security Organization, all kinds of sensitive places, because we knew that is where the WMD materials were controlled and where decisions were made. We would stumble across all kinds of things, but it was not related to our mandate. I cannot tell you for sure if there was any connection between terrorists and WMD in Iraq.

Dr. CORDESMAN. Senator, if I could pick up on a point Charles raised, these are the "crown jewels" to Iraq. Lethal biological

Digitized by Google

Original from
UNIVERSITY OF CALIFORNIA

agents, any kind of radiological agent, or a nuclear weapon that was a fissile weapon would be the Iraqi regime's most valuable asset. This also would be a scenario where if we suddenly saw such weapons in the hands of a terrorist group, we would be immediately asking the question, how did something that sophisticated come into the hands of such a group?

Now, al Qaeda is not the ideal group for Iraq to support. Its ideology is different. There are many other terrorist cells and groups which are more secular, easier to control, and that would be more dependent on Iraq for money. I think even limited aid, such as the provision of a particularly lethal biological strain, would be something Iraq would not do.

At the same time, al Qaeda would not need all that much technical skill to have the ability to conduct an attack in the United States using hazardous materials. It would not take much outside help to get a crude biological agent. There are a lot of ways in which an Iraqi intelligence service might or might not help al Qaeda to acquire CBRN weapons.

At the same time, I know that some of the manuals involved that are required to produce these weapons have been commercially available for more than 15 years in the open literature in English, so it is by no means clear there has been any relationship. There either is a clear chain of evidence to prove Iraqi involvement or there is not. We cannot answer your question. Perhaps the intelligence community can.

Senator HUTCHINSON. Is it your sense that if we had inspectors go back in, if they allowed inspectors back in, that there would be any freer rein, any greater access to these weapons than what you had before? You said it was pretty wide-open, and I am surprised at that.

Mr. DUELFER. Even when we were UNSCOM, when we were traipsing around all these various palaces, we could not find what Iraq desired to conceal. It is difficult for me to imagine any circumstances under which Saddam would permit this new group to go in that would be more effective.

We did a study when we were out of Baghdad on what we believed would be required for effective monitoring in the biological area, which is the toughest one, and it requires a lot of access to people and documents in a very short time frame all over the country. It is hard for me to imagine Saddam making that available, but we will see.

Dr. CORDESMAN. The other issue here, Senator, is what we call break-out capability. When Iraq first used mustard gas it was made in university laboratories. It did not have previous military facilities. Poison gas was used in small amounts, but it was still used.

When Iraq converted a pharmaceutical plant to the mass production of anthrax agents before the Gulf War, it took less than 6 months. So, even if you could dismantle all of the facilities in Iraq today, as long as this regime is present and has the basic technology and has some core elements of proliferation, even a 100 percent or 99 percent inspection effort could not really prevent this regime from proliferating.

Digitized by Google

Original from
UNIVERSITY OF CALIFORNIA

Senator HUTCHINSON. Will there be another round, Madam Chairwoman?

Senator LANDRIEU. Yes, I think there will be. We have some time, and I will get back to you. Thank you, Senator, for those good questions.

Let me follow up with just a couple of things. This was somewhat included in your testimony, but could both of you give your views on the current sanctions that are in place, and the effectiveness of those sanctions in trying to meet our objectives? Also, could you explain to us your views about our allies, particularly France?

I could maybe understand Russia's position, but I have a hard time understanding the French position regarding some of these issues. Perhaps you could shed some light on our allies' views of this current situation of the development of these weapons. Do they not perceive them as a threat, or not care about them, or think maybe there is another way to get the situation turned around? Whoever wants to start.

Dr. CORDESMAN. Senator, let me start quickly. I will leave sanctions largely to Charles. I would note they have been extraordinarily effective in leading to a steady deterioration of the Iraqi conventional military establishment. There has been no major resupply for more than a decade, no Iraqi ability to react to the lessons of the Gulf War. Iraq is still a very powerful force by Gulf standards, but we have done a great deal to weaken it through sanctions.

In the history of proliferation, the problems have never been purely technical. The key barrier to success has always been management and systems integration. If you can buy your way around your ability to manage and integrate by buying foreign technology, it gives you many more advantages than you might think. I am sure that the sanctions have helped there, but I would leave that to Charles.

The one thing I would say about sanctions is that we have done an appalling job of explaining to the region that it is not us who have caused the suffering of the Iraqi people. We have been very slow to really show that we care about the Iraqi people, and have just waited for Saddam to go every year for a decade. This is one of the problems we will face in this region. I can think of only one really meaningful U.S. Government effort in 12 years to explain what sanctions really do, why they are really the fault of Saddam, and how he uses them as a political weapon. I would invite any Senator to look at what the State Department has issued on this topic as a sample of perhaps one of the worst efforts in psychological and political warfare ever written.

In terms of the allies, let me just say first there is only one person who can command allied support, and that is the President. He has to present a convincing proposal. He has to show we are serious, and he has to show the allies that afterwards we will actually have an end game to ensure Iraqi stability. No amount of briefings and visits by anyone else and no amount of speeches by other officials are going to accomplish that goal.

I think that if the President acts decisively and convincingly, a lot of allied attitudes may change, but today there are problems. The French know perfectly well it does not take a lot of tension

Digitized by Google

Original from
UNIVERSITY OF CALIFORNIA

with the United States to help ensure their access to Iraqi oil investments and to Iraqi contracts. It does not take a lot of sympathy for the regime to get them major economic advantages and leverage. There are people in France who I think are almost full-time lobbyists for the Iraqi position, and I do not believe it is out of a deep moral concern for the Iraqi people.

There also is the issue of debt and arms sales, so selfish motives here are very rational, particularly as long as it does not really cost France anything.

Mr. DUELFER. On sanctions, all of this debate comes down to one fundamental control which is left, and that is the control of their checkbook. Iraq does not have control of the revenues from its legal oil sales, and so I think all of the machinations in the UN right now are really designed to address this, to some extent the criticism the United States and others have been under for the sanctions, but while still retaining control of the oil revenues, and that is the real crux of the matter.

The so-called smart sanctions will facilitate a lot of people's work on commerce, but their impact on weapons of mass destruction is not going to be big. The things which are very difficult for Iraq to import legally or illegally are the same. Basically the things they would need for a nuclear program, the things which they need for a missile and everything else, they either can make the stuff indigenously or they can smuggle it in.

I would say that sanctions inhibit the missile program to a certain extent. There are a limited number of places that can build things like gyroscopes, and it is tougher to smuggle those in, but for the most part the real issue is the checkbook.

On our allies, I sat through endless Security Council meetings where the French, Russians, and others would be criticizing UNSCOM, not Iraq, and perhaps I have a skewed perception on this. The French view is that this regime is inevitable, you cannot change it. It is also inevitable that all regimes end eventually so therefore they should be in a position to effect that change when it does happen by having good relations.

I think that encapsulates where they are. They have been, I think, supporting the matter of smart sanctions, keeping Iraq contained under this regime, and that has cost them. Their portion of the oil for food contracts has dropped a lot.

The Russians, on the other hand, have been steadfast in supporting the Iraqis, and they are reaping the contracts that Saddam is issuing as a consequence of that. I think it is a bit of a mixed bag, but all of them at the end of the day have two points of reference that we do not. One, in the back of their mind is containing the United States. The Security Council is a great tool for containing the United States, not that the United States is necessarily a threat, but they want to be able to have their say.

Second, they know that if things go sour, the United States will fix it. Our forces are there. I said earlier, they get a free ride in a sense. They know if things really go screwy the United States, because it is in our interest, will have to deal with the problem.

Senator LANDRIEU. I want to follow up with one question. I happen to agree with you, we really have underfunded and perhaps underappreciated the effectiveness of those kinds of efforts. But

Digitized by Google
Original from UNIVERSITY OF CALIFORNIA

practically, because it is very dangerous—we have many stories of defectors who have subsequently lost their lives, their families lost, missing, tortured. Practically, are there things we could do, in your opinion, to try to pull out of the country people who have the knowledge and sophistication that we would like to protect ourselves against?

Mr. DUELFER. Most Iraqis I was able to talk to who had been involved in the weapons programs were in Europe, and I will not be more specific than that. Few made it to the United States. There are a host of reasons for that, having to do with proximity, immigration laws, etcetera. It seems to me that there ought to be a concerted, coordinated approach to this, whether one of these interagency groups is needed or not, something which I fortunately have not had to experience in a decade.

It seems to me the United States could have a coordinated approach on this, because there are very many bright Iraqis who would be delighted to apply their skills elsewhere, but they do not know how to do it, and they know that people have been burned when they have approached the United States before. I know I was asked on occasion, "should we try to make it to the United States?" In good conscience, for that person's health, I could not recommend that course.

There are a lot of people who would leave if they could, and it is a win-win. We take that much expertise away from the Iraqi WMD threat, and these people can contribute to our knowledge base about what remains behind. Again, as the pressure increases on Baghdad, Baghdad is going to get to be a very ugly place, and we may be able to work this in a sense to our advantage, to cause people to leave earlier rather than later.

Senator LANDRIEU. Dr. Cordesman, anything to add?

Dr. CORDESMAN. No.

Senator LANDRIEU. Senator Hutchinson.

Senator HUTCHINSON. I know we are short on time. I had just one follow-up question. In regard to our military option, Dr. Cordesman, I think both of you had said that there is no easy answer, but if it were done it had to be decisive, it had to be overwhelming, and it had to have a definite outcome, and that would involve, both of you said, an American presence on the ground. Also, clearly from your testimony there is the existence of biological weapons, including anthrax; they have that capability.

Given those realities, and the failure of our own vaccine production program in the United States and our immunization program on anthrax for our troops, it would follow to me—and I just want your reaction to this—that we need to have, in order to protect our forces, a very robust vaccine production program, and vaccine immunization program for anthrax and smallpox before we would put our troops into that kind of ground position in Iraq.

Dr. CORDESMAN. I would think, Senator, quite frankly at this point in time we would take risks, but we would take even more risks if we waited. It depends on the timing of the vaccine. Certainly, from what I know about smallpox and anthrax vaccine stocks, we could immunize the troops we would have to deploy.

The anthrax vaccine may not be 100 percent effective, but I do not know of any technical evidence that it would not be adequate.

Digitized by Google

Original from UNIVERSITY OF CALIFORNIA

When we talked about U.S. forces, however, this is another reason why you need decisive forces. You need to be able to use air and land power quickly, surgically, and with enough effect to break up any kind of cohesive Iraqi resistence.

That does not mean we will not take casualties or we will not take risks, but if we wait for the risk we will face in 3 or 5 years as distinguished from the risk we face now, it is not clear that buying more vaccines will really make the situation better.

Senator HUTCHINSON. I think the vaccine capability could be addressed very quickly, in a matter of months, not in a matter of years, so that we could render that protection.

Mr. Duelfer, did you want to say anything?

Mr. DUELFER. I would agree with what Tony said. I would point out that we are in a much worse situation than we were in 1991.

Senator HUTCHINSON. We did not go to Baghdad.

Mr. DUELFER. True, and that is a problem.

I would also point out one of the last known smallpox outbreaks was in Iraq, so the potential of them actually having that is not negligible, it is serious.

Senator HUTCHINSON. Thank you.

Senator LANDRIEU. Senator Nelson.

Senator BILL NELSON. Thank you, Madam Chairwoman. Before we go into closed session, see if you can answer this for the record. It took us about 6 months to build up when we started in the Gulf War. Now, if we discovered that Iraq were suddenly getting ready with the likelihood to use weapons of mass destruction in a 2-month, 3-month period, how would we respond, and could we respond with the kind of force that would be necessary to neutralize that threat?

Dr. CORDESMAN. You have not described whether we are talking nuclear or biological, or the numbers involved and the delivery systems, but if it is to totally neutralize the threat, the answer is no.

Could you create a climate in which it would be virtually impossible for Iraq to conduct coherent military operations and use these weapons in large amounts with any effectiveness, with the kind of air power targeting and other capabilities we have? I think the answer would be yes. That would not necessarily deal with the kind of covert attacks that we discussed before you came in, Senator, but again, everything depends on the quality of our intelligence and our targeting capabilities.

My guess would be that our intelligence would be so limited that we would have to launch an absolutely massive air campaign to be certain of suppressing such an offensive capability by Iraq as thoroughly as possible. We would have to explain to the world that in the process many of the targets we hit were not targets we could prove had weapons of mass destruction, and that there would be serious collateral damage.

Let me give you a specific example. One of the possible places that you can produce biological weapons is an infant formula plant. One of the places you could produce these weapons is a pharmaceutical plant. You are not going to leave those targets behind in your scenario just because you, say, have only a 10 percent confidence that that is where they are actually being made rather than 90 percent.

Digitized by Google
Original from UNIVERSITY OF CALIFORNIA

Mr. DUELFER. There is definitely a history for them colocating military and civilian activities. Part of their agent production was a place called the Daura Foot and Mouth Disease Production Plant, which is a pharmaceutical plant, but it had been making biological agent before. Bear in mind, this is the mindset that puts civilians in palaces as their own SDI. They place civilians right next to military locations. It is a heavy price to pay if we were to attack.

Senator BILL NELSON. I have a number of questions for the closed session.

Senator LANDRIEU. Thank you. We are going to move now into the closed session, but let me just wrap up again by thanking you very much for your very candid comments and remarks and for the years you have spent in this area, because our President and this Congress are going to have to make some very tough decisions about the position we are going to take regarding this one particular threat.

Let me express to the members of the subcommittee how much I appreciate their help in this exploration, because this subcommittee is charged with identifying emerging threats, and I remind myself and all of us that Iraq obviously is a threat, and we are trying to define what that threat is. There are materials all around us in our own Nation that can be used in the wrong hands at the wrong time by people who have sometimes very difficult motives to understand.

So we are going to take our time to explore all of the many facets of this, but I thought that this hearing was very timely. I think we got a lot of good information, and very good testimony on the record about how we should and can proceed in this regard.

We are going to now move to closed session, which is in room SR–232–A. Let me just say that only those that are appropriately cleared will be admitted. Before proceeding to the room, let me remind everyone to turn off all electronic devices before entering the room. We will adjourn here and proceed in about 5 minutes to the next room.

[Questions for the record with answers supplied follow:]

QUESTIONS SUBMITTED BY SENATOR BOB SMITH

LOW END ITEMS

1. Senator SMITH. Dr. Cordesman, a good deal of the information presented to date deals with the production of weapons and Iraq's delivery capabilities on the battlefield and in the geographical region. Has there has been any information gathered or gleaned about the lower-end items associated with Iraq's ability to sustain a WMD combat offensive capability—items such as individual protective measures, personnel and equipment decontamination capabilities, and so on—that would indicate their ability to conduct sustained operations over time or do indicators point to a one time, big bang use of nuclear, biological, or chemical weapons at a tactical or strategic level?

Dr. CORDESMAN. Iraq still has very significant supplies of chemical weapons defense gear. It is unclear that it has effective vaccines for all of its potential biological weapons, although it should have sufficient antibiotics to deal with limited casualties from accidents in handling anthrax. It is doubtful that Iraq could cope with any outbreak from a use of smallpox as a weapon. In general, however, Iraq is far more likely to use biological weapons at ranges or distances that preclude the need for extensive defensive gear or immunization.

The real problem for Iraq is that any attack using highly lethal biological agents is almost certain to trigger a massive U.S. response, or Israeli response should Israel come under attack. The same would be true of a nuclear attack. The level of provocation is so high that Iraq's leaders would have to see it as a desperate one-

Digitized by Google
Original from UNIVERSITY OF CALIFORNIA

time action. The same may be true of anything but highly local limited use of chemical weapons against Iraqi domestic targets. President Bush has sent a very clear message and Iraq must realize that any use of a CBRN weapon could trigger a major U.S. military response and effort to overthrow the regime.

OPERATION DESERT STORM

2. Senator SMITH. Dr. Cordesman, can it be either positively confirmed or denied that our troops during Operation Desert Storm were exposed to the biological weapons you spoke of in your prepared remarks?

Dr. CORDESMAN. There is no firm evidence that U.S. or allied troops were exposed to biological weapons during Operation Desert Storm, and claims that such weapons were used against the Kurds have never been documented. This does not mean it is not possible that some weapons were used and proved ineffective or that the U.S. caused the release of some agent during its air and ground attacks. If this happened, however, any casualties are in the noise level of the statistical patterns and fluctuations in frequency of symptoms and disease in small population samples.

IRAQ'S THREAT TO ISRAEL

3. Senator SMITH. Dr. Cordesman, we all recall Iraq's capability and practice during Operation Desert Storm of hitting Israel with SCUD–B ballistic missiles, which were topped with conventional munitions. Does Iraq retain the same capability of delivering ordnance onto the land of Israel today? Does it have better capabilities? Does it have the ability to deliver nuclear, biological, or chemical agents?

Dr. CORDESMAN. We really do not know. Many advances in warhead design can be accomplished with little visibility and tests without missile firings. A test of power or vapor dissemination and fusing might also be possible on a missile fired without the permitted 150 kilometer range and might not be detectable by U.S. intelligence. There is no unclassified evidence, however, of actual tests of such weapons on a missile warhead.

4. Senator SMITH. Dr. Cordesman, what defenses are we pursuing to protect both Israel and our other friends in the region, such as Kuwait, Oman, Turkey, and Bahrain, from similar attacks?

Dr. CORDESMAN. Upgrades to the Patriot offer significant increases in defense in those countries where the Patriot is deployed and the U.S. can airlift in more defenses. We have worked with our allies to help them develop passive and civil defenses, and we have somewhat improved our targeting and strike capability to preempt and suppress Iraqi attacks. At this point in time, however, we have no clear idea of when we will have truly advanced wide-area theater missile defenses, what their cost will be, and how effective they will be. It is easy to be pro-missile defense, but we probably will have nothing actually ready beyond the Patriot PAC 3 level for the next decade.

ANY MEANS NECESSARY

5. Senator SMITH. Mr. Duelfer, when Iraq ignored the United Nations resolution and kicked out weapons inspectors the world stood by and watched while the Clinton administration did nothing about it. I think that was a contributing factor in Usama bin Ladin's thinking that the United States was weak and that his cowardly attacks would be successful and not responded to. Do you think the United States enforcing the resolution by any means necessary is the right thing to do?

Mr. DUELFER. Given the high value the Baghdad regime attaches to WMD, the only way they will completely relinquish this capability is under sufficient threat that, in effect, threatens the regime. Senior Iraqis as much as stated this. The relative absence of consequences to Iraqi defiance during the past several years has convinced the regime that they can pursue WMD and other activities which erode the UN sanctions. In my opinion this trend must change and probably will only change when there is a new government in Baghdad.

NAVAL THREATS

6. Senator SMITH. Mr. Duelfer, have you seen any indications that Iraq—or for that matter the other states in the axis of evil—is pursuing mounting and launching its ballistic missiles on ships? What would be the technological limitations on such

Digitized by Google

Original from
UNIVERSITY OF CALIFORNIA

an approach? How close are we to seeing this type of threat? How easy would it be for the United States to detect such a threat?

Mr. DUELFER. I have not seen any efforts on the part of Iraq to deploy ballistic missiles on ships. Bear in mind they have very limited access to the sea and the U.S. would likely interdict any suspicious Iraqi ship seeking to pass through the Gulf. Iraq has focused attention on studying long range ballistic missiles.

[Whereupon, at 4:07 p.m., the subcommittee adjourned.]

Digitized by Google

Original from
UNIVERSITY OF CALIFORNIA

U. C. BERKELEY LIBRARIES
C081721950

Digitized by Google
Original from
UNIVERSITY OF CALIFORNIA

Digitized by Google

Original from
UNIVERSITY OF CALIFORNIA

S. HRG. 107–573

THE WEAPONS OF MASS DESTRUCTION PROGRAM OF IRAQ

HEARING

BEFORE THE

SUBCOMMITTEE ON EMERGING THREATS AND CAPABILITIES

OF THE

COMMITTEE ON ARMED SERVICES UNITED STATES SENATE

ONE HUNDRED SEVENTH CONGRESS

SECOND SESSION

FEBRUARY 27, 2002

Printed for the use of the Committee on Armed Services

U. S. DEPOSITORY

AUG 2 2 2002

U.S. GOVERNMENT PRINTING OFFICE

80–791 DTP WASHINGTON : 2002

For sale by the Superintendent of Documents, U.S. Government Printing Office
Internet: bookstore.gpo.gov Phone: toll free (866) 512–1800; DC area (202) 512–1800
Fax: (202) 512–2250 Mail: Stop SSOP, Washington, DC 20402–0001

Digitized by Google

Original from
UNIVERSITY OF CALIFORNIA

S. HRG. 107–573

THE WEAPONS OF MASS DESTRUCTION PROGRAM OF IRAQ

HEARING

BEFORE THE

SUBCOMMITTEE ON EMERGING THREATS AND CAPABILITIES

OF THE

COMMITTEE ON ARMED SERVICES UNITED STATES SENATE

ONE HUNDRED SEVENTH CONGRESS

SECOND SESSION

FEBRUARY 27, 2002

Printed for the use of the Committee on Armed Services

U. S. DEPOSITORY

AUG 2 2 2002

U.S. GOVERNMENT PRINTING OFFICE

80–791 DTP WASHINGTON : 2002

For sale by the Superintendent of Documents, U.S. Government Printing Office
Internet: bookstore.gpo.gov Phone: toll free (866) 512–1800; DC area (202) 512–1800
Fax: (202) 512–2250 Mail: Stop SSOP, Washington, DC 20402–0001

Digitized by Google

Original from
UNIVERSITY OF CALIFORNIA

S. HRG. 107–573

THE WEAPONS OF MASS DESTRUCTION PROGRAM OF IRAQ

HEARING

BEFORE THE

SUBCOMMITTEE ON EMERGING THREATS AND CAPABILITIES

OF THE

COMMITTEE ON ARMED SERVICES UNITED STATES SENATE

ONE HUNDRED SEVENTH CONGRESS

SECOND SESSION

FEBRUARY 27, 2002

Printed for the use of the Committee on Armed Services

U. S. DEPOSITORY

AUG 2 2 2002

U.S. GOVERNMENT PRINTING OFFICE

80–791 DTP WASHINGTON : 2002

For sale by the Superintendent of Documents, U.S. Government Printing Office
Internet: bookstore.gpo.gov Phone: toll free (866) 512–1800; DC area (202) 512–1800
Fax: (202) 512–2250 Mail: Stop SSOP, Washington, DC 20402–0001

Digitized by Google

Original from
UNIVERSITY OF CALIFORNIA

S. HRG. 107–573

THE WEAPONS OF MASS DESTRUCTION PROGRAM OF IRAQ

HEARING

BEFORE THE

SUBCOMMITTEE ON EMERGING THREATS AND CAPABILITIES

OF THE

COMMITTEE ON ARMED SERVICES UNITED STATES SENATE

ONE HUNDRED SEVENTH CONGRESS

SECOND SESSION

FEBRUARY 27, 2002

Printed for the use of the Committee on Armed Services

U. S. DEPOSITORY

AUG 2 2 2002

U.S. GOVERNMENT PRINTING OFFICE

80–791 DTP WASHINGTON : 2002

For sale by the Superintendent of Documents, U.S. Government Printing Office
Internet: bookstore.gpo.gov Phone: toll free (866) 512–1800; DC area (202) 512–1800
Fax: (202) 512–2250 Mail: Stop SSOP, Washington, DC 20402–0001

Digitized by Google

Original from
UNIVERSITY OF CALIFORNIA

S. HRG. 107–573

THE WEAPONS OF MASS DESTRUCTION PROGRAM OF IRAQ

HEARING

BEFORE THE

SUBCOMMITTEE ON EMERGING THREATS AND CAPABILITIES

OF THE

COMMITTEE ON ARMED SERVICES UNITED STATES SENATE

ONE HUNDRED SEVENTH CONGRESS

SECOND SESSION

FEBRUARY 27, 2002

Printed for the use of the Committee on Armed Services

U. S. DEPOSITORY

AUG 2 2 2002

U.S. GOVERNMENT PRINTING OFFICE

80–791 DTP WASHINGTON : 2002

For sale by the Superintendent of Documents, U.S. Government Printing Office
Internet: bookstore.gpo.gov Phone: toll free (866) 512–1800; DC area (202) 512–1800
Fax: (202) 512–2250 Mail: Stop SSOP, Washington, DC 20402–0001

Digitized by Google

Original from
UNIVERSITY OF CALIFORNIA

S. HRG. 107–573

THE WEAPONS OF MASS DESTRUCTION PROGRAM OF IRAQ

HEARING

BEFORE THE

SUBCOMMITTEE ON EMERGING THREATS AND CAPABILITIES

OF THE

COMMITTEE ON ARMED SERVICES UNITED STATES SENATE

ONE HUNDRED SEVENTH CONGRESS

SECOND SESSION

FEBRUARY 27, 2002

Printed for the use of the Committee on Armed Services

U. S. DEPOSITORY

AUG 2 2 2002

U.S. GOVERNMENT PRINTING OFFICE

80–791 DTP WASHINGTON : 2002

For sale by the Superintendent of Documents, U.S. Government Printing Office
Internet: bookstore.gpo.gov Phone: toll free (866) 512–1800; DC area (202) 512–1800
Fax: (202) 512–2250 Mail: Stop SSOP, Washington, DC 20402–0001

Digitized by Google

Original from
UNIVERSITY OF CALIFORNIA

S. HRG. 107–573

THE WEAPONS OF MASS DESTRUCTION PROGRAM OF IRAQ

HEARING

BEFORE THE

SUBCOMMITTEE ON EMERGING THREATS AND CAPABILITIES

OF THE

COMMITTEE ON ARMED SERVICES UNITED STATES SENATE

ONE HUNDRED SEVENTH CONGRESS

SECOND SESSION

FEBRUARY 27, 2002

Printed for the use of the Committee on Armed Services

U. S. DEPOSITORY

AUG 2 2 2002

U.S. GOVERNMENT PRINTING OFFICE

80–791 DTP WASHINGTON : 2002

For sale by the Superintendent of Documents, U.S. Government Printing Office
Internet: bookstore.gpo.gov Phone: toll free (866) 512–1800; DC area (202) 512–1800
Fax: (202) 512–2250 Mail: Stop SSOP, Washington, DC 20402–0001

Digitized by Google

Original from
UNIVERSITY OF CALIFORNIA

S. HRG. 107–573

THE WEAPONS OF MASS DESTRUCTION PROGRAM OF IRAQ

HEARING

BEFORE THE

SUBCOMMITTEE ON EMERGING THREATS AND CAPABILITIES

OF THE

COMMITTEE ON ARMED SERVICES UNITED STATES SENATE

ONE HUNDRED SEVENTH CONGRESS

SECOND SESSION

FEBRUARY 27, 2002

Printed for the use of the Committee on Armed Services

U. S. DEPOSITORY

AUG 2 2 2002

U.S. GOVERNMENT PRINTING OFFICE

80–791 DTP WASHINGTON : 2002

For sale by the Superintendent of Documents, U.S. Government Printing Office
Internet: bookstore.gpo.gov Phone: toll free (866) 512–1800; DC area (202) 512–1800
Fax: (202) 512–2250 Mail: Stop SSOP, Washington, DC 20402–0001

Digitized by Google

Original from
UNIVERSITY OF CALIFORNIA

S. HRG. 107–573

THE WEAPONS OF MASS DESTRUCTION PROGRAM OF IRAQ

HEARING

BEFORE THE

SUBCOMMITTEE ON EMERGING THREATS AND CAPABILITIES

OF THE

COMMITTEE ON ARMED SERVICES UNITED STATES SENATE

ONE HUNDRED SEVENTH CONGRESS

SECOND SESSION

FEBRUARY 27, 2002

Printed for the use of the Committee on Armed Services

U. S. DEPOSITORY

AUG 2 2 2002

U.S. GOVERNMENT PRINTING OFFICE

80–791 DTP WASHINGTON : 2002

For sale by the Superintendent of Documents, U.S. Government Printing Office
Internet: bookstore.gpo.gov Phone: toll free (866) 512–1800; DC area (202) 512–1800
Fax: (202) 512–2250 Mail: Stop SSOP, Washington, DC 20402–0001

Digitized by Google

Original from
UNIVERSITY OF CALIFORNIA

S. HRG. 107–573

THE WEAPONS OF MASS DESTRUCTION PROGRAM OF IRAQ

HEARING

BEFORE THE

SUBCOMMITTEE ON EMERGING THREATS AND CAPABILITIES

OF THE

COMMITTEE ON ARMED SERVICES UNITED STATES SENATE

ONE HUNDRED SEVENTH CONGRESS

SECOND SESSION

FEBRUARY 27, 2002

Printed for the use of the Committee on Armed Services

U. S. DEPOSITORY

AUG 2 2 2002

U.S. GOVERNMENT PRINTING OFFICE

80–791 DTP WASHINGTON : 2002

For sale by the Superintendent of Documents, U.S. Government Printing Office
Internet: bookstore.gpo.gov Phone: toll free (866) 512–1800; DC area (202) 512–1800
Fax: (202) 512–2250 Mail: Stop SSOP, Washington, DC 20402–0001

Digitized by Google

Original from
UNIVERSITY OF CALIFORNIA