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# **Iraqi Military Forces Ten Years After the Gulf War**

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## **Introduction**

**The following briefing supplements the comprehensive analysis of the Iraqi threat in Anthony H. Cordesman, Iraq and the War of Sanctions, Praeger, Westport, 1999. This text provides a full scenario analysis of Iraqi conventional war fighting capabilities, and options for using weapons of mass destruction and provides supporting references and analysis.**

**Additional material on the Iraqi threat, and a wide range of security issues relating to security issues in the Middle East, proliferation, arms transfers, arms control, and energy economics can be found in the downloadable reports in the “Strategic Assessments” section of the CSIS web page: [CSIS.ORG](http://CSIS.ORG)**

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# **Part One**

# **The Dynamics of the Regional Military Balance**

## Gulf Military Demographics and Forces in 2000

### MILITARY DEMOGRAPHY

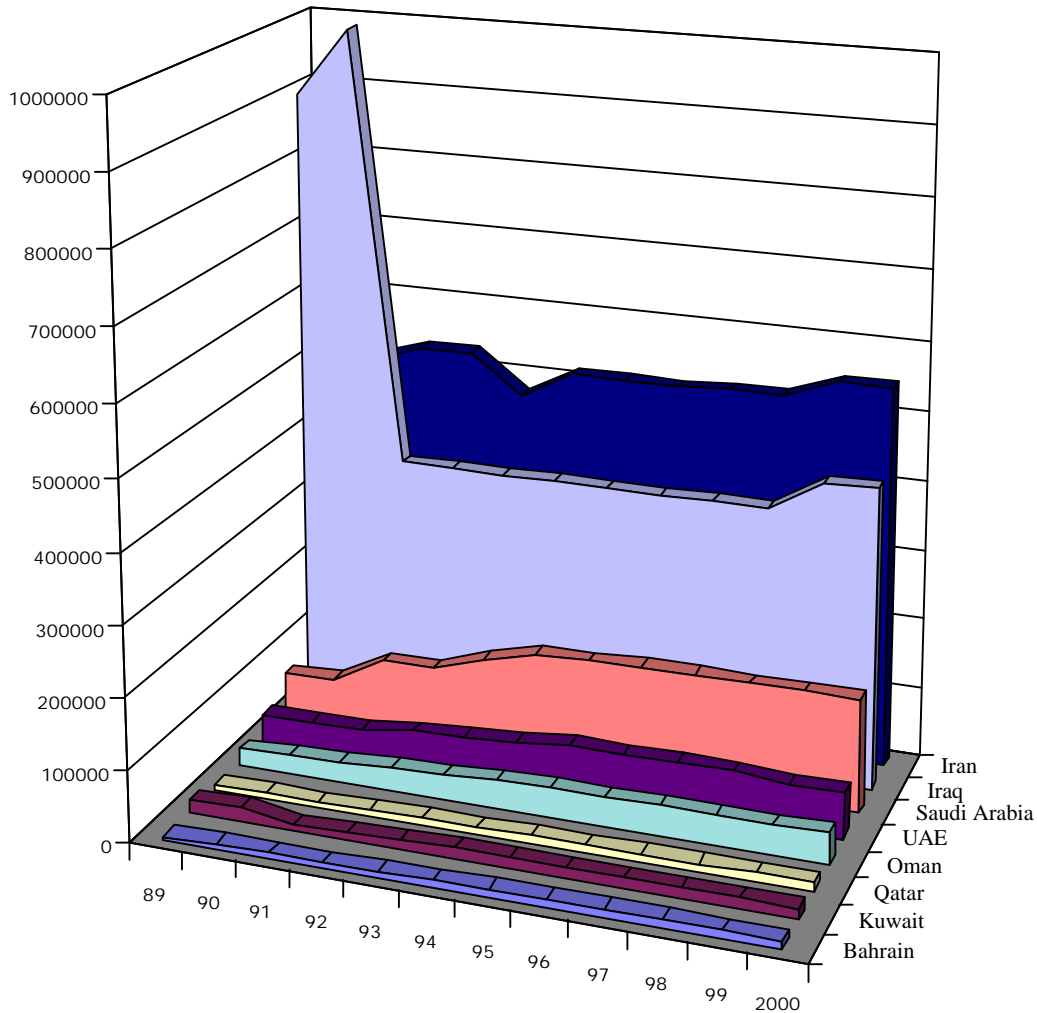
<u>Country</u>	<u>Total Population</u>	<u>Males Reaching</u> <u>Military Age</u> <u>Each Year</u>	<u>Males Between the Ages of</u>			<u>Males Between 15 and 49</u>	
			<u>13 and 17</u>	<u>18 and 22</u>	<u>23 and 32</u>	<u>Total</u>	<u>Medically Fit</u>
Iran	72,644,000	776,512	4,438,000	3,694,000	5,582,500	17,203,000	10,217,000
Iraq	23,846,000	260,000	1,457,000	1,237,000	1,828,000	5,460,000	3,058,000
Bahrain	629,000	-	32,000	25,000	40,000	220,675	121,451
Kuwait	2,200,000	20,854	117,000	98,000	146,000	610,205	363,735
Oman	2,213,000	-	126,000	101,000	149,000	753,000	420,000
Qatar	681,000	6,125	25,000	20,000	35,000	301,500	158,000
Saudi Arabia	18,000,000	197,386	1,304,000	1,088,000	1,615,000	5,697,000	3,171,900
UAE	2,650,000	23,358	86,000	82,000	142,000	791,100	425,000
Yemen	18,000,000	212,000	939,000	772,000	1,259,000	3,776,000	2,119,000
Djibouti	7333,000	-	40,000	33,000	53,000	105,100	61,700
Eritrea	3,994,000	-	238,000	199,000	303,000	-	-
Ethiopia	57,000,000	655,000	3,7066,000	2,993,000	4,513,000	13,520,000	7,053,000
Somalia	6,300,000	-	587,000	4477,000	687,000	1,730,500	963,000
Sudan	32,194,000	379,000	1,888,000	1,596,000	2,399,000	7,942,000	4,890,000
Turkey	65,161,000	659,000	3,267,000	3,257,000	5,953,000	18,169,000	11,024,000

### MILITARY FORCES

<u>Country</u>	<u>Total Active</u> <u>Manning</u>	<u>Total Active</u> <u>Army Manning</u>	<u>Tanks</u>	<u>OAFVs</u>	<u>Artillery</u>	<u>Combat</u>	
						<u>Aircraft</u>	<u>Helicopters</u>
Iran	545,000	450,000	1,410	1,105	3,224	304	100
Iraq	387,500	350,000	2,700	3,400	2,200	353	120
Bahrain	11,000	8,500	106	411	107	24	26
Kuwait	15,300	11,000	385	455	68	76	20
Oman	43,500	31,500	141	219	109	40	0
Qatar	11,100	8,500	44	284	44	18	12
Saudi Arabia	162,500	127,000	1,055	4,285	568	432	33
UAE	64,500	59,000	237	1,138	289	99	49
Yemen	66,300	61,000	1,030	1,290	702	89	8
Djibouti	9,600	8,000	0	31	6	0	0
Eritrea	200,000	180,000	-	-	-	-	-
Ethiopia	325,500	300,000	500	220	300	71	24
Somalia	-	-	-	-	-	-	-
Sudan	94,700	90,000	280	598	806	51	9
Turkey	639,000	525,000	4,205	2,515	4,453	440	37

Source: Adapted by Anthony H. Cordesman, CIA World Factbook and IISS, Military Balance.

### Comparative Trends in Gulf Total Active Military Manpower: 1979-2000



	89	90	91	92	93	94	95	96	97	98	99	2000
Bahrain	3350	6000	7450	7150	7150	8100	10700	10700	10700	10700	11000	11000
Kuwait	20300	20300	8200	11700	13700	16600	16600	16600	16600	16600	15300	15300
Qatar	7000	7500	7500	7500	9500	10100	11,100	11,200	11800	11800	11800	11800
Oman	25500	29500	30400	35700	36700	42900	43500	43500	43500	43500	43500	43500
UAE	43000	44000	44000	54500	57500	61500	70000	70000	70000	70000	64500	64500
Saudi Arabia	72300	75700	115000	115000	139000	158000	161000	162500	162500	162500	162500	162500
Iraq	900000	1000000	382500	383500	382500	382500	382500	382500	382500	382500	429000	429000
Iran	604500	504000	528000	528000	473000	513000	513000	513000	518000	518000	545600	545600

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

Note that Saudi includes full-time active National Guard, Oman includes Royal Guard, Iran includes Revolutionary Guards, and Iraq includes Republican Guards and Special Republican Guards.



## Gulf Military Forces in 2000 - Part One

	<u>Iran</u>		<u>Iraq</u>		<u>Bahrain</u>		<u>Kuwait</u>	<u>Oman</u>	<u>Qatar</u>	Saudi	<u>UAE</u>
<u>Yemen</u>											
											<u>Arabia*</u>
Manpower											
Total Active	545,600	429,000	11,000	15,300	43,500	11,800	162,500	64,500	66,300		
Regular	420,600	429,000	11,000	15,300	37,000	11,800	105,500	64,500	66,300		
National Guard & Other	125,000	0	0	0	6,500	0	57,000	0	0		
Reserve	350,000	650,000	0	23,700	0	0	20,000	0	40,000		
Paramilitary	40,000	50,000	10,150	5,000	4,400	0	15,500	1,100	70,000		
Army and Guard											
Manpower	450,000*	375,000	8,500	11,000	31,500	8,500	127,000	59,000	61,000		
Regular Army Manpower	350,000	375,000	8,500	11,000	25,000	8,500	70,000	59,000	61,000		
Reserve	350,000	450,000	0	0	0	0	20,000	0	40,000		
Active Main Battle Tanks	1,345	1,900	106	293	117	44	710	237	1,030		
Total Main Battle Tanks***	1,410	2,700	106	385	141	44	1,055	237	1,320		
Active AIFV/Recce, Lt. Tanks	555	1,600	71	355	78	112	1,655	578(20)	650		
Active APCs	550	1,800	340	100	103	172	2,630	570	640		
Total APCs	550	2,000	340	140	103	172	3,440	570	640		
ATGM Launchers	420+	480+	15	118	68	124+	480+	275	71		
Self Propelled Artillery	290	150	62	41 (59)	18	28	190	177	30		
Towed Artillery	2,170	1,800	36	0	91	12	318(58)	46	452		
MRLs	764+	150	9	27	0	4	60	66 (24)	220		
Mortars	6,500	2,000+	18	50+	89	39	510+	135	600		
SSM Launchers	46	36?	0	0	0	0	10	6	30		
Light SAM Launchers	700	1,100	62	0	72	0	650	100	300		
AA Guns	1,700	5,500	24	0	26	0	10	62	442		
Air Force Manpower	25,000	35,000	1,500	2,500	4,100	1,500	18,000	4,000	3,500		
Air Defense Manpower	25,000	17,000	0	0	0	0	4,000	0	0		
Total Combat Aircraft	304	353	24	76	40	18	432	99	89(40)		
Bombers	0	6?	0	0	0	0	0	0	0		
Fighter/Attack	140	130	12	40	12	18	160	43	27		
Fighter/Interceptor	114	180	12	8	0	0	191	22	16		
Recce/FGA Recce	15	8	0	0	12	0	10	8	0		
AEW C4I/BM	0	0	0	0	0	0	5	0			
MR/MPA**	5	0	0	0	0	0	0	0	0		
OCU/COIN/CCT	0	18	0	28	16	0	21	26	0		
Other Combat Trainers	5	155	0	0	0	0	50	0	6		
Transport Aircraft****	54	34	3	4	21	6	72	22	16		
Tanker Aircraft	5	2	0	0	0	0	15	0	0		
Total Helicopters	613	500	33	32	31	24	184	97	25		
Armed Helicopters****	100	120	26	20	0	12	33	49	8		
Other Helicopters****	113	380	7	12	31	6	151	47	17		
Major SAM Launchers	155	340	8	24	0	0	128	36	57		
Light SAM Launchers	65	200	0	60	28	9	309	134	120		
AA Guns	-	6,000	-	60	-	-	270	-	-		

## Gulf Military Forces in 2000 - Part Two

	<u>Iran</u>	<u>Iraq</u>	<u>Bahrain</u>	<u>Kuwait</u>	<u>Oman</u>	<u>Qatar</u>	Saudi	<u>UAE</u>	
<u>Yemen</u>									
							<u>Arabia*</u>		
Total Naval Manpower	40,600*	2,000	1,000	1,800	4,200	1,800	13,500	1,500	1,800
Regular Navy	20,600	2,000	1,000	1,800	4,200	1,800	10,500	1,500	1,800
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	2	0	8	4	0
Other	2	1-2	0	0	0	0	0	0	0
Patrol Craft									
Missile	20	1	4	6	4	3	9	8	5
(Revolutionary Guards)	5	-	-	-	-	-	-	-	-
Other	42	5	6	5	7	4	17	9	8
Revolutionary Guards (Boats)	40	-	-	-	-	-	-	-	-
Submarines	3	0	0	0	0	0	0	0	0
Mine Vessels	7	4	0	0	0	0	7	0	6
Amphibious Ships	9	0	0	0	1	0	0	0	1
Landing Craft	17	-	4	2	4	1	8	5	2
Support Ships	25	3	5	6	5	-	7	2	2
Naval Air	2,000	-	-	-	-	-	-	-	-
Naval Aircraft									
Fixed Wing Combat	0	0	0	0	0	0	0	0	0
MR/MPA	8	0	0	0	(7)	0	0	0	0
Armed Helicopters	9	(6)	0	0	0	0	21	(8)	0
SAR Helicopters		0	0	0	0	0	4	(6)	0
Mine Warfare Helicopters	2	0	0	0	0	0	0	0	0
Other Helicopters	-	-	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(1,540) APCs, and 70 towed artillery weapons.

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

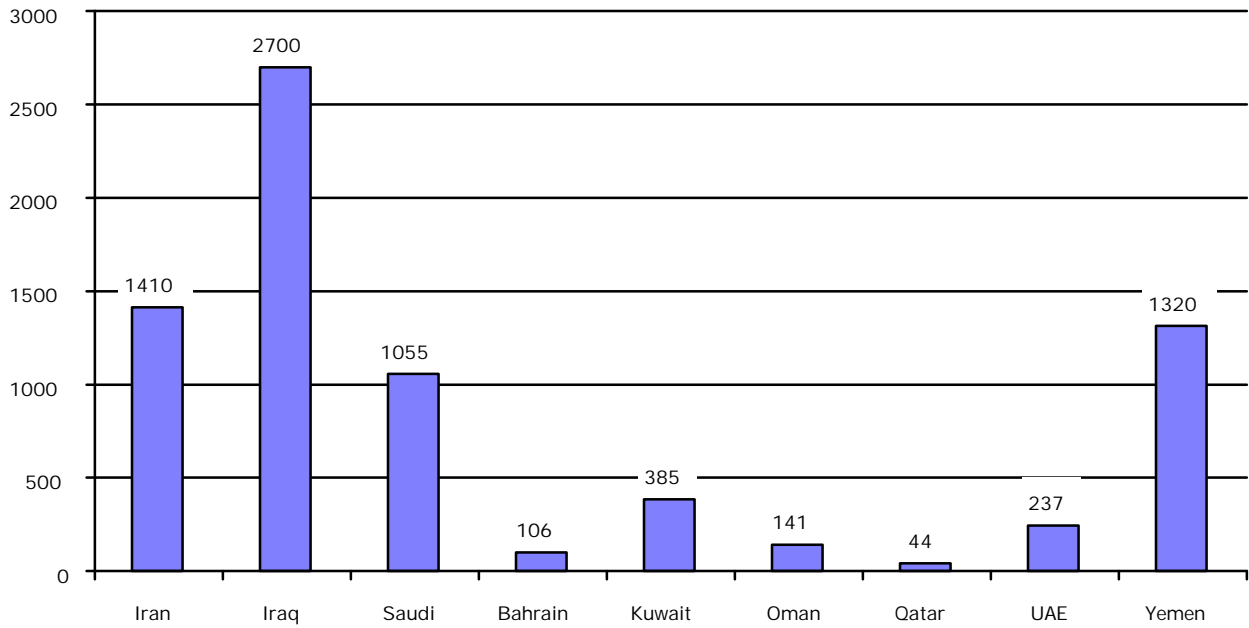
\*\*\*\* Includes navy, army, national guard, and royal flights, but not paramilitary.

\*\*\*\*\* Includes in Air Defense Command

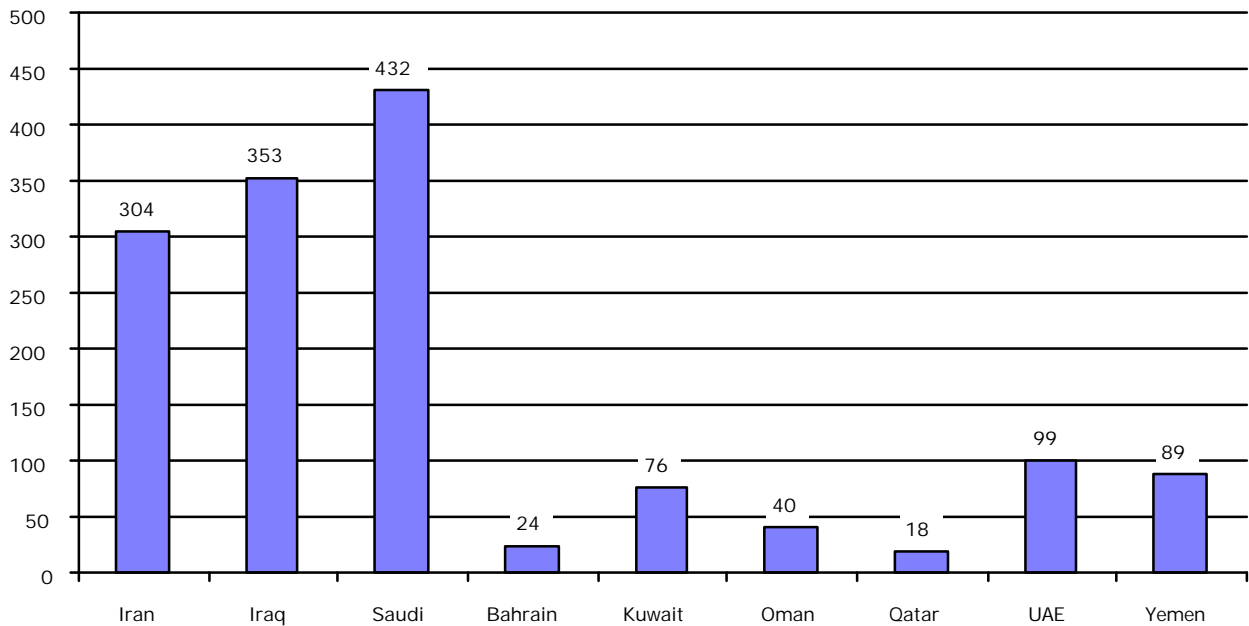
Source: Adapted by Anthony H. Cordesman from interviews, International Institute for Strategic Studies, Military Balance (IISS, London); Jane's Sentinel, Military Technology, World Defense Almanac; and Jaffee Center for Strategic Studies, The Military Balance in the Middle East (JCSS, Tel Aviv)

### Major Measures of Combat Equipment Strength - 2000

Total Main Battle Tanks in Inventory



Total Fixed Wing Combat Aircraft



Source: Adapted by Anthony H. Cordesman from various sources and the IISS, Military Balance.

## **Part Two**

# **The Impact of Economics and Demographics**

## Iraq - Overview

- The broad trends in Iraqi central government expenditures, military expenditures, and arms spending reflect the virtual collapse of Iraq's economy, and a near cut off of military imports since 1991.
- Iraq's military effort placed a massive burden on its economy throughout the Iran-Iraq War and during August 1988 through July 1988. Its efforts to rebuild its forces since the Gulf War have involved such high military expenditures relative to Iraq's GDP that they have reached the crisis level and have been a critical factor in the decline in living standards in Iraq.
- The trends in terms of military expenditure per capita versus GDP per capita are even worse than the trend in gross military expenditures versus total GDP. Iraq clearly has a government which cares little for the welfare of its people, and which emphasizes guns over butter even at the cost of a devastating cut in per capita income.
- A detailed comparison of the trends in the Iraqi economy versus the Iraqi military and arms import effort reveals that Iraq began to encounter critical problems in funding its military efforts as early as 1985. It also reveals that Iraq has chosen guns over butter since the Gulf War at an immense cost in terms of the resulting share of GDP.
- As a result, Iraq began to experience a crisis in recapitalizing its military forces as early as 1985, and the Gulf War turned this crisis into a virtual catastrophe. Iraq's military machine may retain a massive order of battle, but Iraq's lack of arms imports means that its military readiness and sustainability is only a fraction of what it was in 1990.
- 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 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.

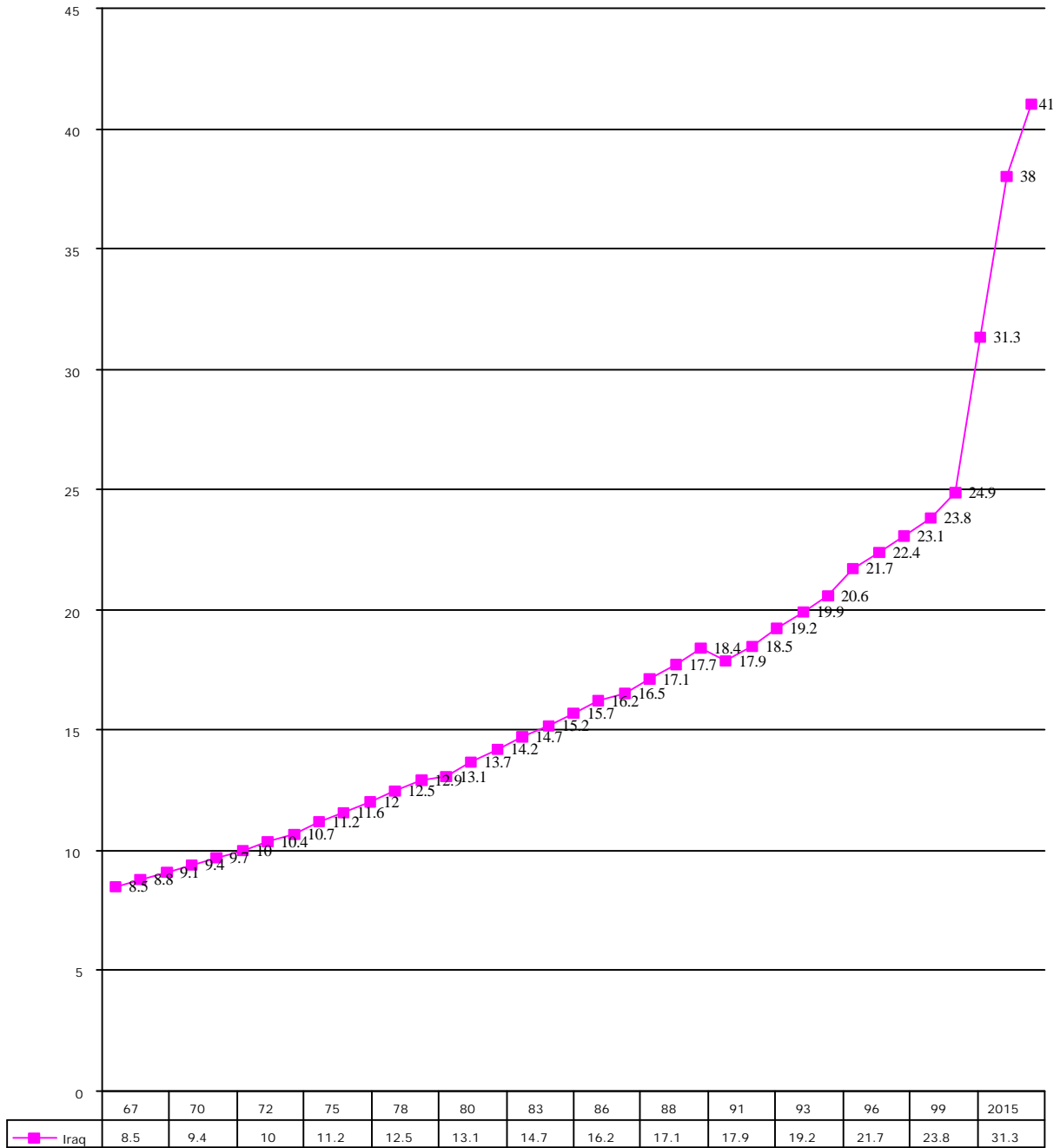
## Iraq – Overview – Part II

- Iraq's Gross Domestic Product (GDP) has been cut sharply since before the Iraqi invasion of Kuwait, with per-capita income (around \$587 in 1999) and living standards far below pre-war levels. On the other hand, Iraq's real GDP growth in 1999 is estimated at 13% (with 17% real growth expected in 2000). In 1999, inflation was estimated at 135%, and unemployment was high as well. Inflation is expected to decline, to 110%, in 2000, and to 60% in 2001, while exports are expected to exceed imports by \$4 billion.
- Sanctions have played a critical role in limiting the Iraqi threat. They have blocked arms imports since August 1990, as well as imports of the technology needed to make and deliver weapons of mass destruction. They have also affected Iraq's ability to fund arms imports and its military forces. Prior to Iraq's invasion of Kuwait in 1990, Iraq was producing over 3 million barrels/day and exporting 2.8 million barrels/day. Following Iraq's invasion of Kuwait, Iraqi oil exports were prohibited by United Nations (U.N.) Security Council Resolution 661.
- In April 1995, the U.N. Security Council passed Resolution 986, which allows limited Iraqi oil exports for humanitarian and other purposes. The Iraqi Cabinet formally turned down this offer on April 16, 1995 and not until May 20, 1996 was an agreement signed to allow Iraq to sell \$2 billion worth of oil for food and medical supplies (after deducting a predetermined amount for war reparations to Kuwait and to fund operations of the United Nations Special Commission, or UNSCOM).
- Implementation of Resolution 986, known as the Iraqi Oil-for-Food program, was frozen on September 1, 1996 because of Iraqi attacks in northern Iraq and Iraqi efforts to renegotiate the accord. Iraq actually began exporting oil under Resolution 986 in December 1996. The Oil-for-Food program requires that half of the Iraqi oil shipments be exported via Turkey to help Turkey regain oil transit revenues that were lost during the ban on Iraqi exports.
- Since 1995, the Iraqi Oil-for-Food program has been extended several times, beginning on December 4, 1997. On February 20, 1998, the U.N. Security Council unanimously approved an increase in the amount of oil Iraq may export from \$2.14 billion to \$5.265 billion over a 180-day period. The Iraqi Oil-for-Food program was extended again on March 25, 1998. On November 24, 1998, the U.N. extension also included an allowance of \$300 million for spare parts and other material needed to rebuild Iraq's oil industry to enable it to export the additional oil.
- Iraqi officials repeatedly have stated their hopes that U.N. Resolution 986 will lead to a complete lifting of all U.N. sanctions against Iraq. On December 12, 1998 Iraq's Information Minister said that his government hoped that the new six-month stage of the "Oil-for-Food" program would be the last before a full lifting of sanctions.
- In anticipation of the eventual complete lifting of sanctions, Iraq already has signed potentially lucrative oil and gas deals with companies from Russia, France, China, and dozens of foreign oil companies from a wide variety of countries have been in discussions with the Iraqi government.
- In order for the U.N. sanctions to be lifted, however, Iraq must meet the requirements of U.N. Security Council Resolution 687 (paragraph 22), which provides that the oil embargo will continue until Iraq meets all U.N. conditions, including destruction of all weapons of mass destruction such as nuclear, chemical and biological weapons.
- Over the past several years, repeated Iraqi failures to satisfy U.N. conditions have led to confrontations between Iraq and the United Nations. On August 5, 1998, Iraq announced that it was suspending cooperation with UNSCOM and its weapons inspectors in Iraq, and on October 31, 1998 Iraq went even further, vowing to cease all cooperation with U.N. arms inspectors and monitors unless the 8-year-old U.N. embargo were lifted. There have been no inspections since that time, in spite of military operations like Desert Fox, and the creation of a new UN inspection regime.

### Iraq – Overview – Part III

- In June 1999 Iraq attempted to shore up the value of its currency, the dinar, by selling hard currency to the public at near-black-market rates and by encouraging the public to open hard-currency accounts. In July 1999, Iraq established a free-trade zone north of Mosul, in northern Iraq. In November 1999, Iraq reportedly signed three economic and trade agreements with Iran.
- Sanctions remain a major issue. On December 3, 1999, the U.N. Security Council voted to accept a U.S.-backed 1-week extension (through December 11) in the Iraq "oil-for-food" program. Iraq rejected the one-week extension and said that it would not resume exporting oil at least for the week. Iraq stopped its oil exports (running around 2.3 million barrels per day) on November 22, after the U.N. Security Council adopted only a two-week renewal of the "oil-for-food" program. Exceptions included Jordan as well as oil pumped into storage at the Ceyhan terminal in Turkey. (Ceyhan had 3.5-3.7 million barrels of Iraqi oil in storage as of December 7, 1999).
- The Security Council remains divided between those, like the United States, which hope to use the "oil-for-food" program as leverage to return U.N. weapons inspectors (absent from Iraq since December 1998), and those, like China, France, and Russia, who have been pushing for suspension of sanctions with fewer conditions. On December 4, Iraq threatened that French oil companies (i.e., Elf and Total) would lose "the huge oil investment opportunities they have been granted" if France voted in favor of the U.S.-backed Security Council resolution. On December 10, the Security Council voted unanimously to renew the "oil-for-food" program for another six months. The resolution allows Iraq to export \$5.26 billion worth of oil, and to spend \$300 million on improving the country's oil sector.
- 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.

### Iraq - Total Population: 1967-2015 (In Millions)

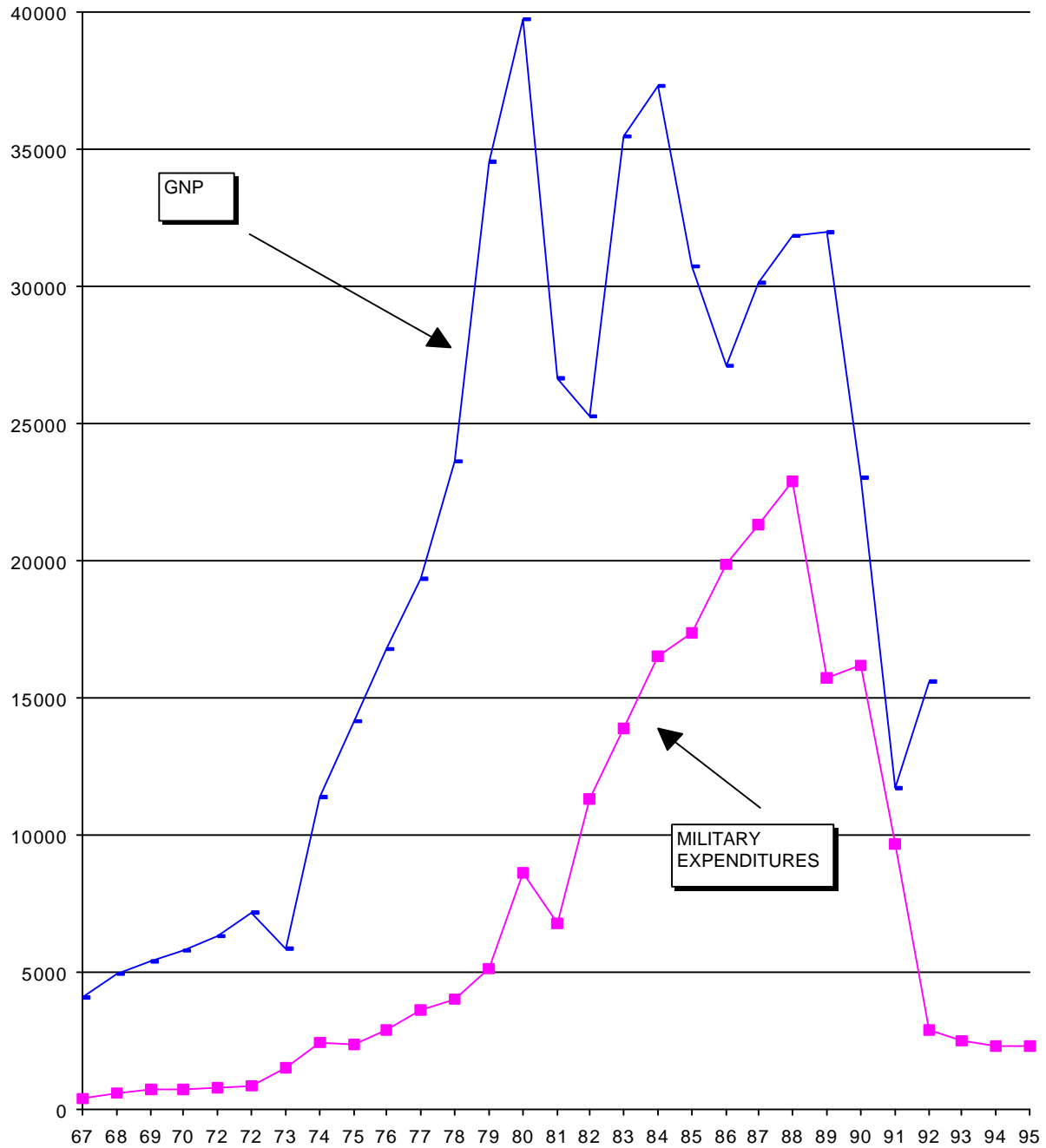


Source: Adapted by Anthony H. Cordesman from ACDA. World Military Expenditures and Arms Transfers, Table II, various editions. Iraqi data after 1991 are author's estimate.



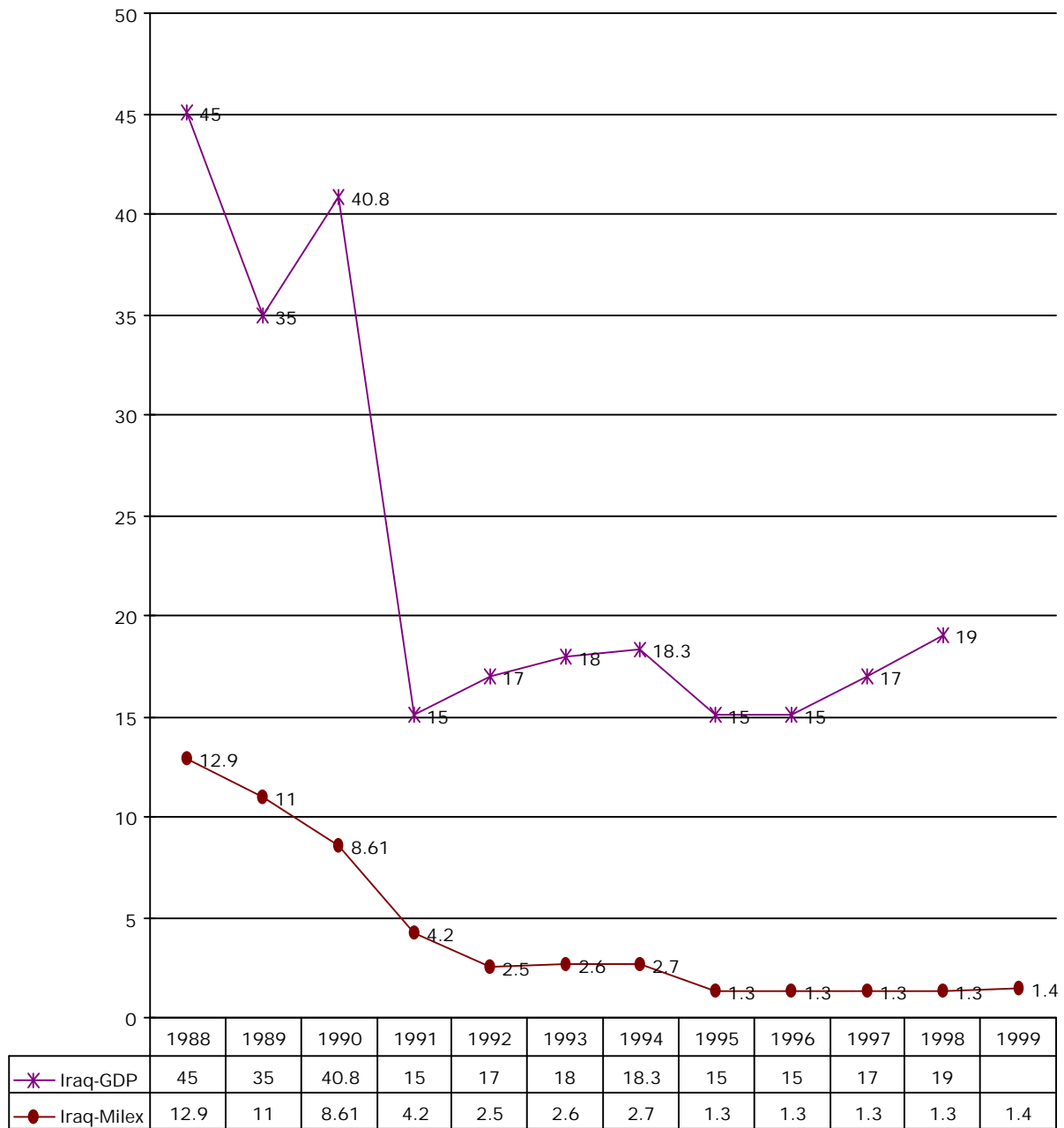
### Iraqi GNP versus Military Spending in Current Dollars: 1967-1995

(\$US Current Millions)



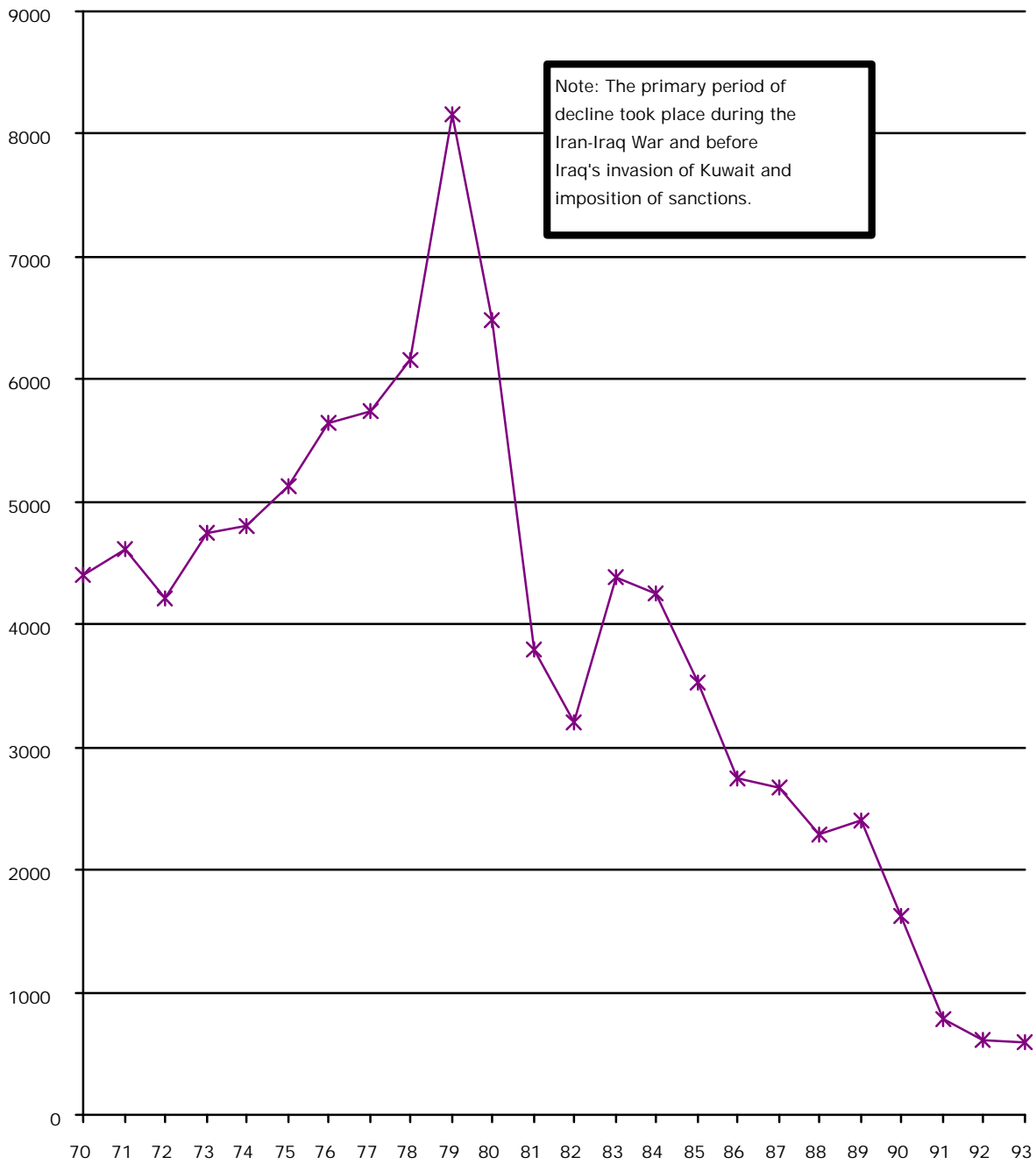
Source: Adapted by Anthony H. Cordesman from ACDA. *World Military Expenditures and Arms Transfers*, Table 1, various editions. Iraqi data after 1991 are author's estimate.

### IISS Estimate of Recent Iraqi GDP AND Military Expenditures (Current US \$ Billions)



Source: Adapted by Anthony H. Cordesman from IISS, Military Balance, 1997/1998, p. 116.

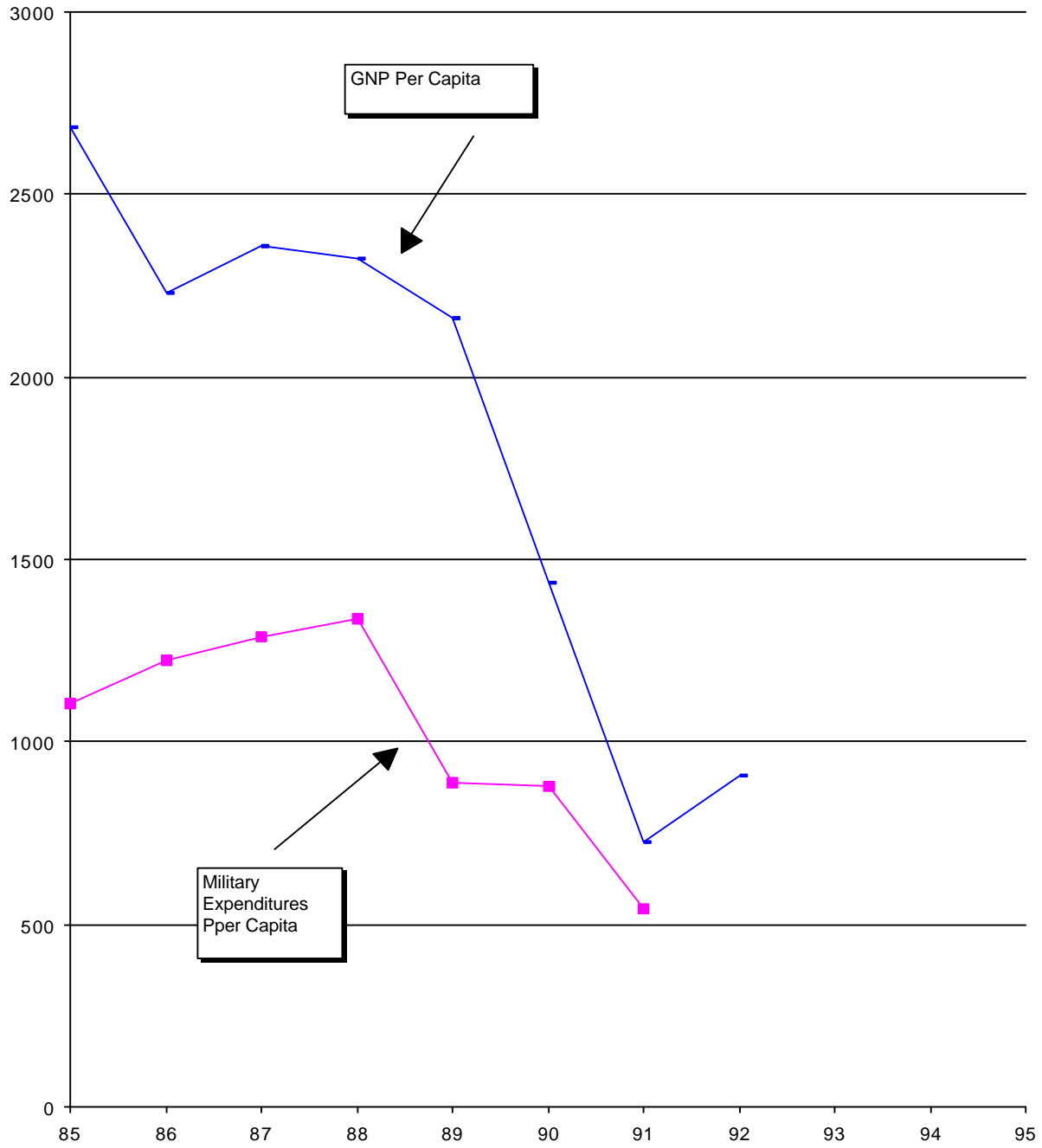
### Iraqi Per Capita Income (in Constant 1987 US Dollars)



Source: Adapted by Anthony H. Cordesman from International Energy Agency (IEA) Middle East Oil and Gas, Paris, 1995, pp. 247-248

### Iraqi Per Capita Income versus Military spending Per Capita: 1985-1995

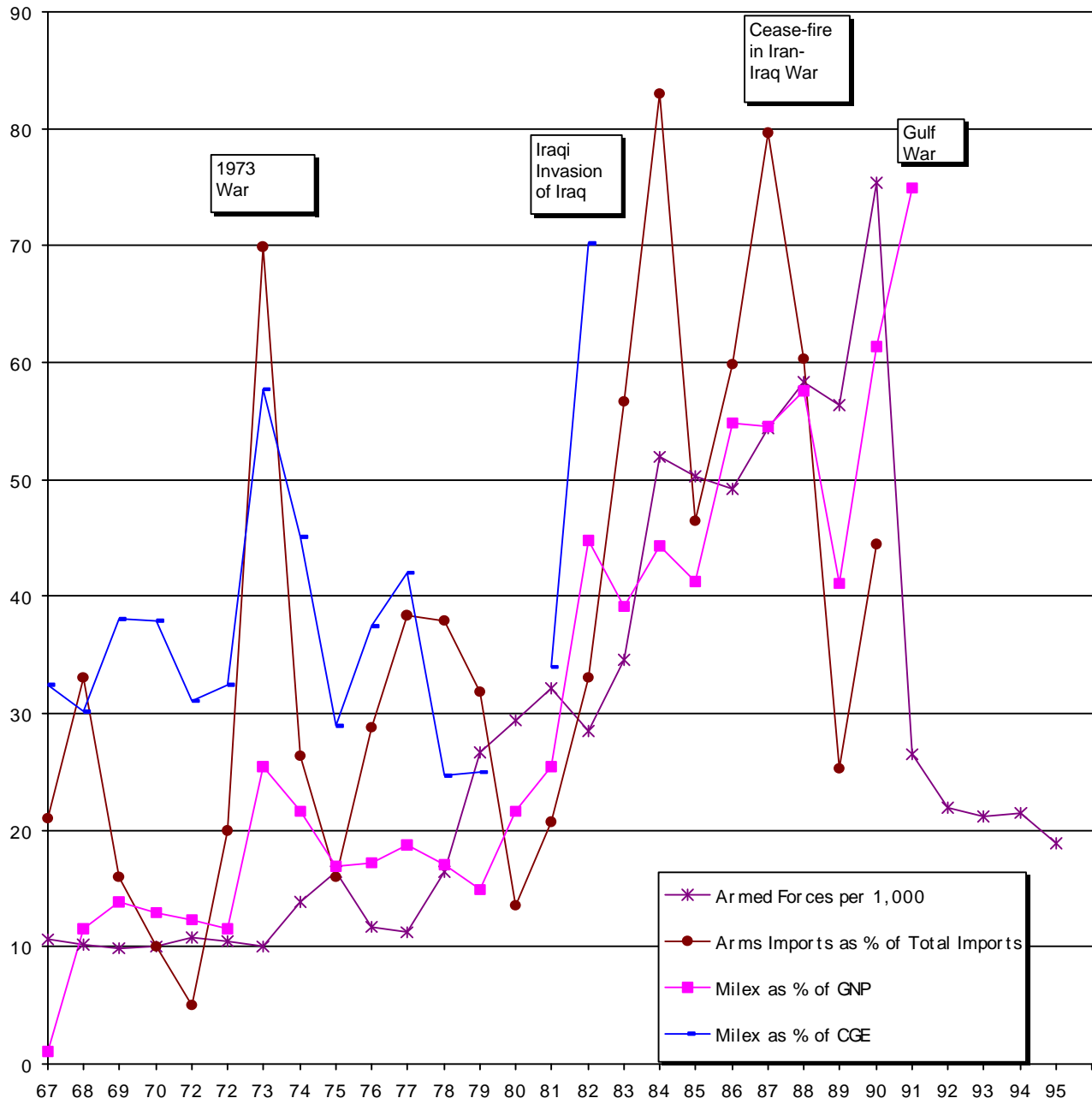
(In constant \$US 1995 millions)



	85	86	87	88	89	90	91	92	93	94	95
GNP Per Capita	2683	2228	2360	2325	2160	1435	723	907	-	-	-
Military Expenditures per Capita	1105	1222	1287	1337	887	880	541	-	-	-	-

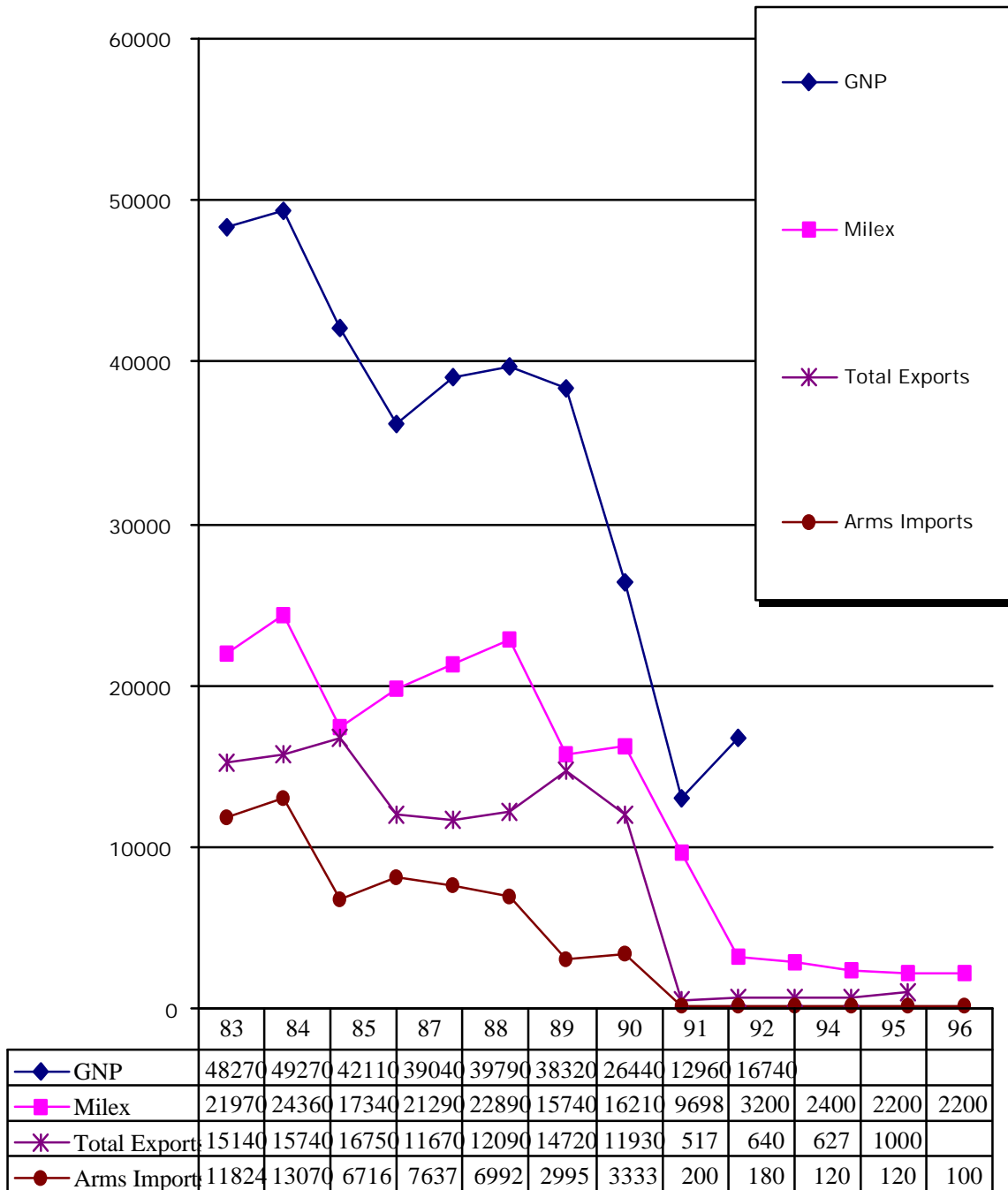
Source: Adapted by Anthony H. Cordesman from ACDA. World Military Expenditures and Arms Transfers, Table 1, various editions. Iraqi data after 1991 are author's estimate.

### Iraqi Military Burden: 1967-1995 (In Percent)



Source: Adapted by Anthony H. Cordesman from ACDA. World Military Expenditures and Arms Transfers, Table 1, various editions. Iraqi data after 1991 are author's estimate.

### Iraqi Gross National Product, Military Expenditures, Total Exports, and Arms Import Deliveries (Constant \$95 millions)

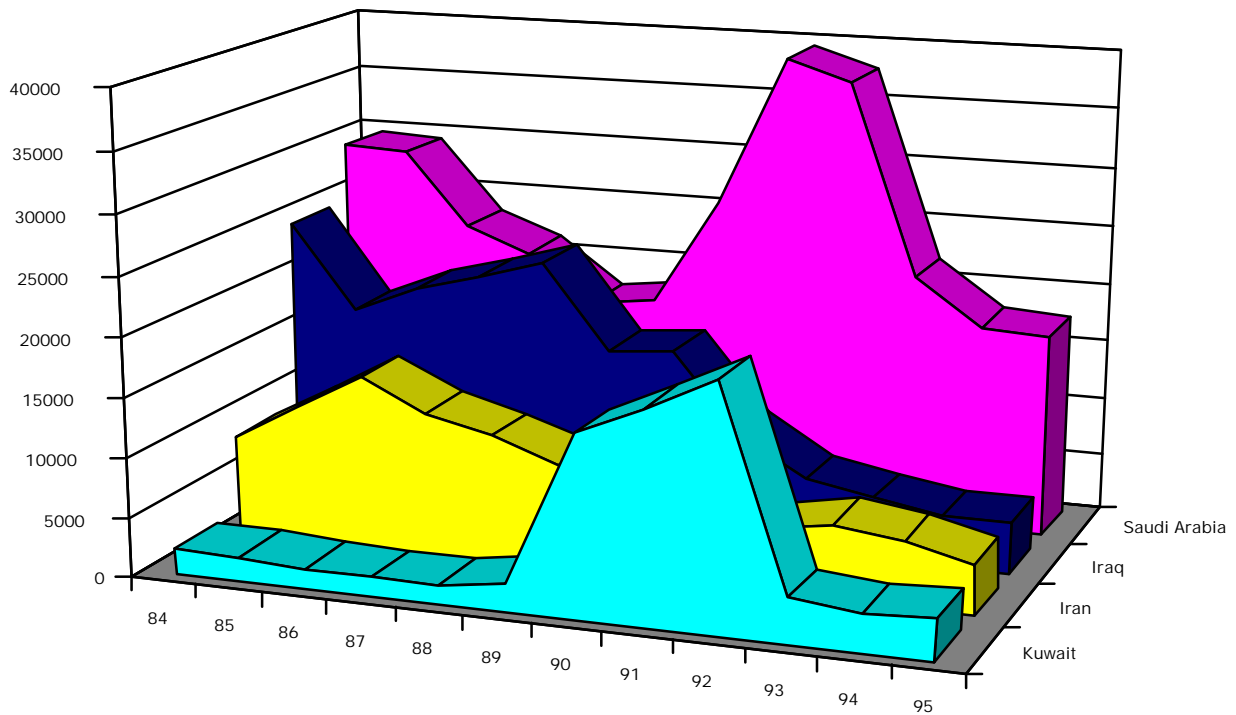


Source: Adapted by Anthony H. Cordesman from ACDA, World Military Expenditures and Arms Transfers, ACDA/GPO, Washington, various editions.

# **Part Three**

# **Military Expenditures**

### Comparative Military Expenditures of the High Expenditure Gulf Powers: 1983-1995 (1995 Constant Millions)

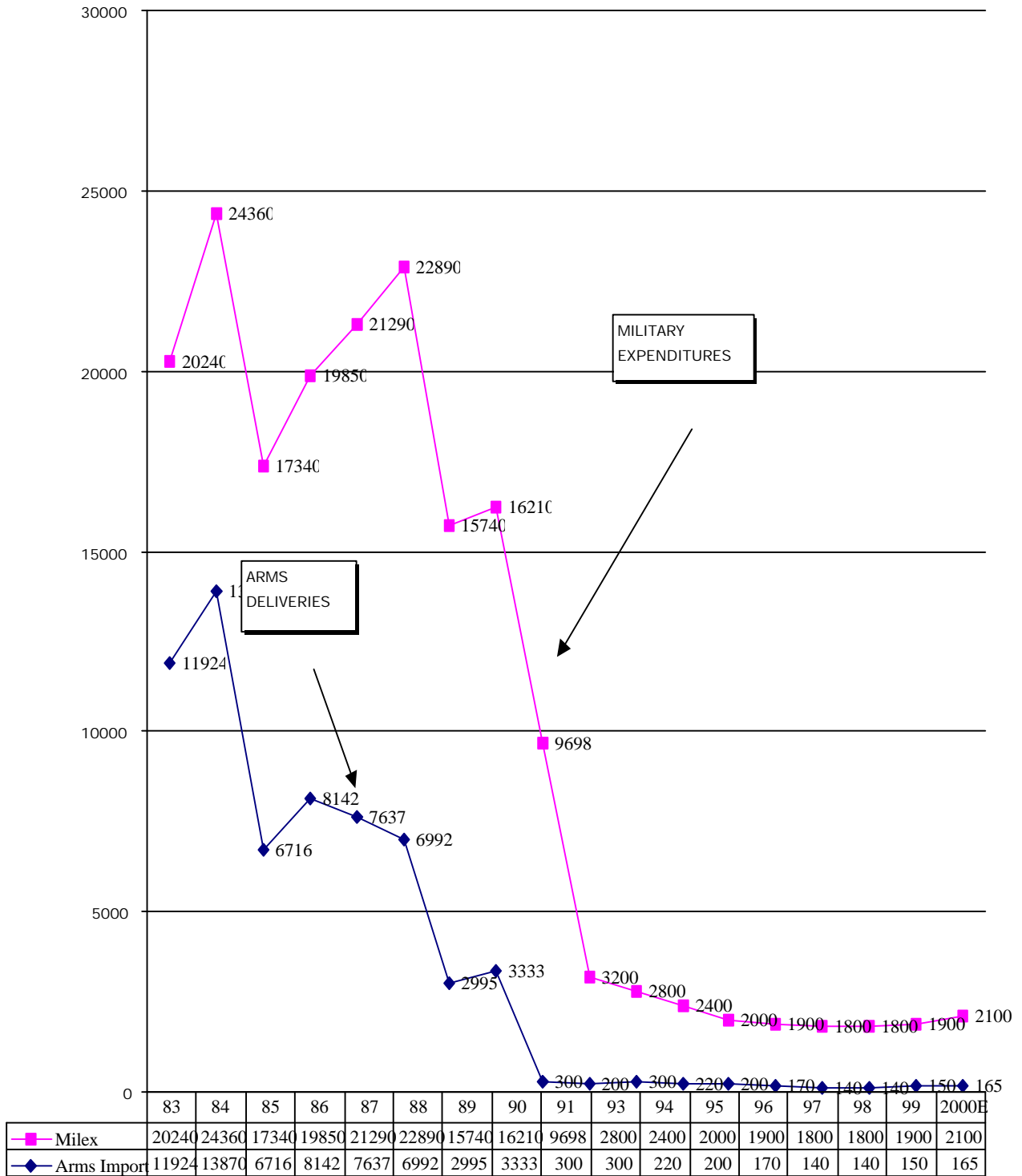


	84	85	86	87	88	89	91	92	93	94	95
■ Kuwait	2088	2057	1708	1609	1565	2316	17620	20430	3759	3146	3488
■ Iran	8686	11680	14840	12190	10860	8893	8654	5410	6333	5586	4191
■ Iraq	24560	17430	19850	21290	22890	15740	9698	6430	5280	4380	4380
■ Saudi Arabia	29530	29240	23080	20980	16980	17600	39240	37650	21470	17630	17210

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



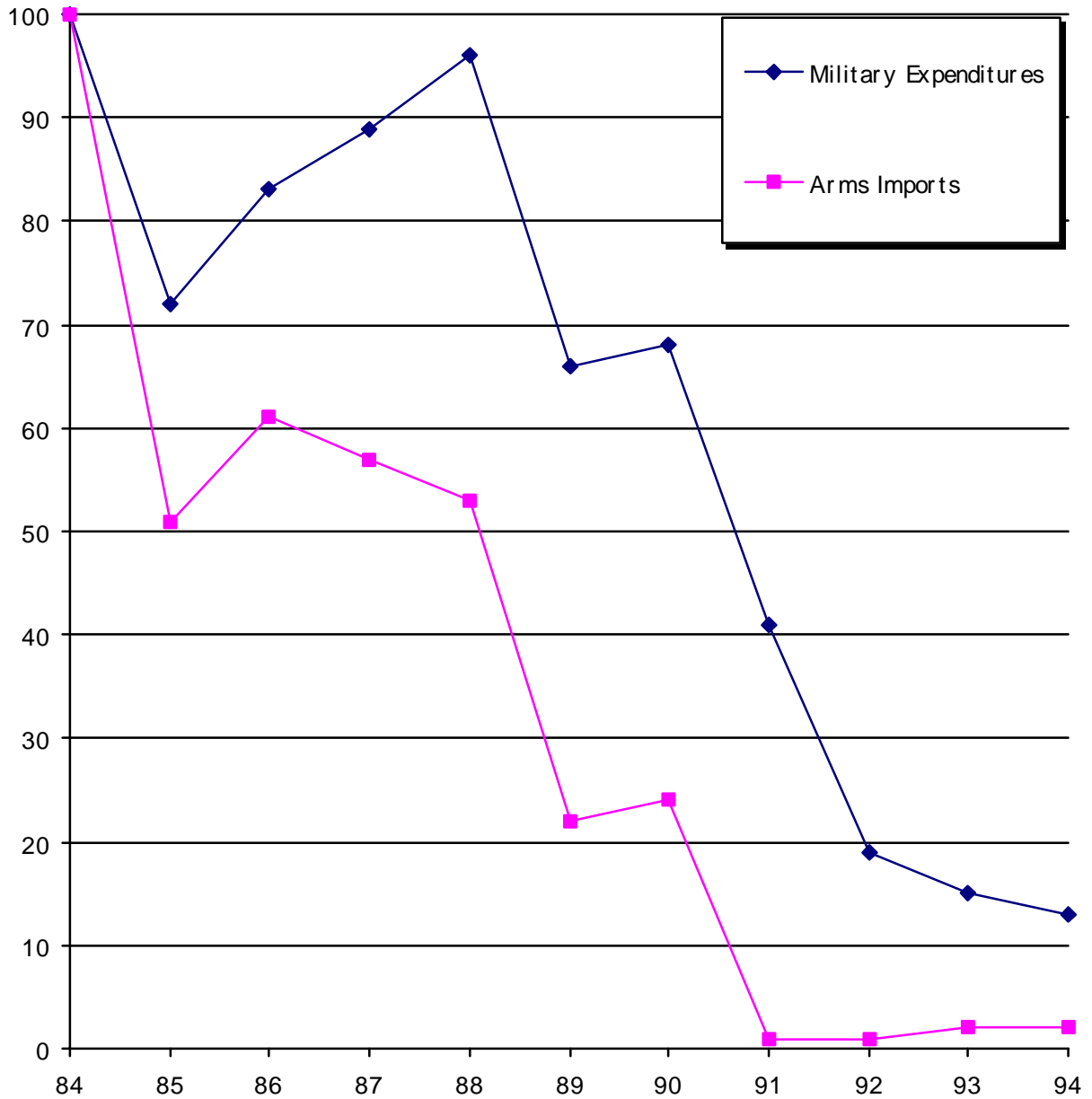
### Iraqi Military Expenditures and Arms Transfers (Constant \$95 millions)



Source: Adapted by Anthony H. Cordesman from ACDA, World Military Expenditures and Arms Transfers, ACDA/GPO, Washington, various editions and IISS, Military Balance, various editions. Estimates adjusted by author.

### Iraqi Military Expenditures and Arms Imports as a Percent of 1984 Total: 1984-1994

(Measured in Percent of \$94 Constant Millions)

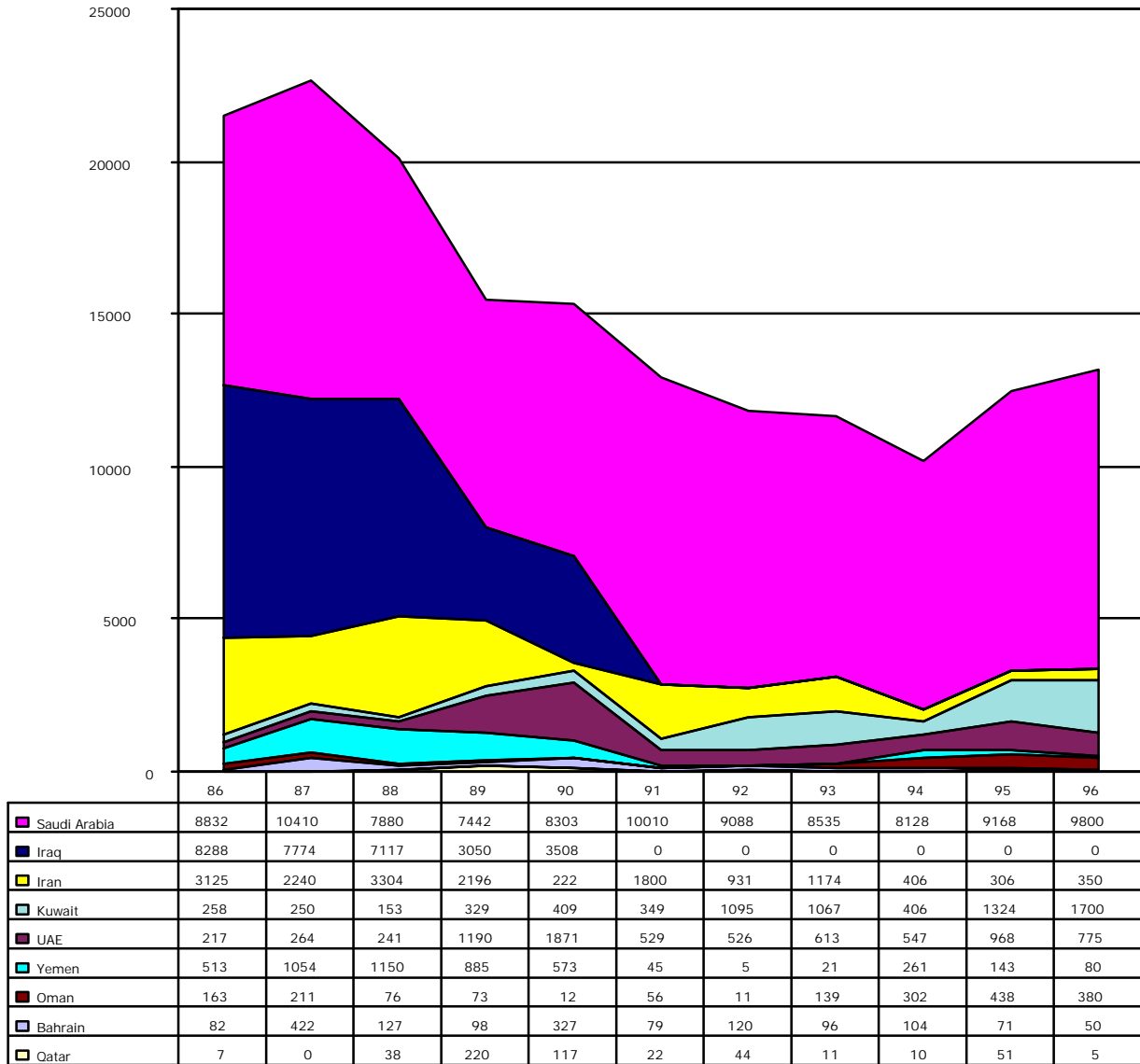


Source: Adapted by Anthony H. Cordesman from US Arms Control and Disarmament Agency, World Military Expenditures and Arms Transfers, 1995, GPO, Washington, 1996.

# **Part Four**

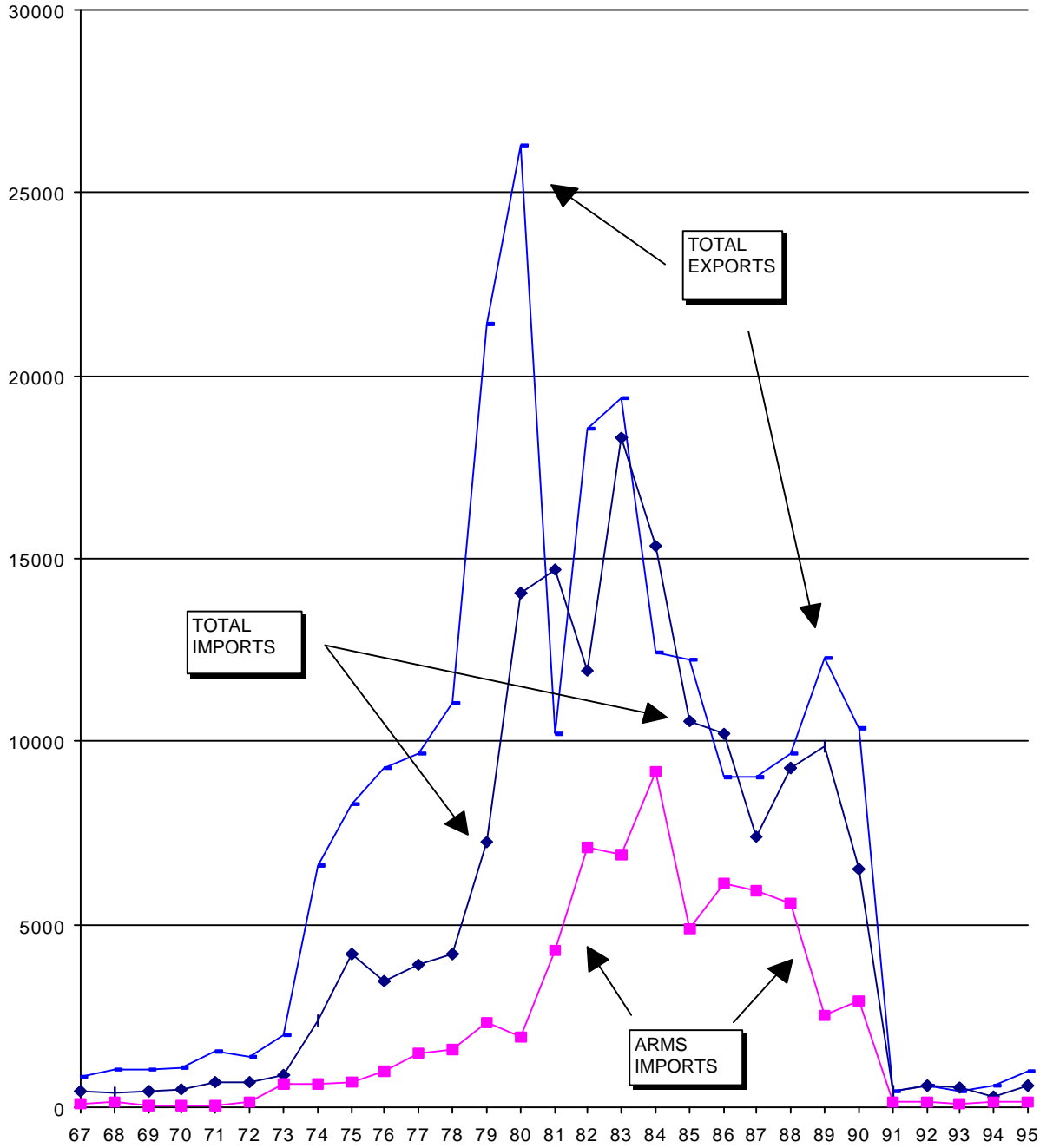
## **Arms Imports and Military Production**

### Cumulative Arms Imports of the Gulf States - 1984-1996 (Constant \$1996 Millions)



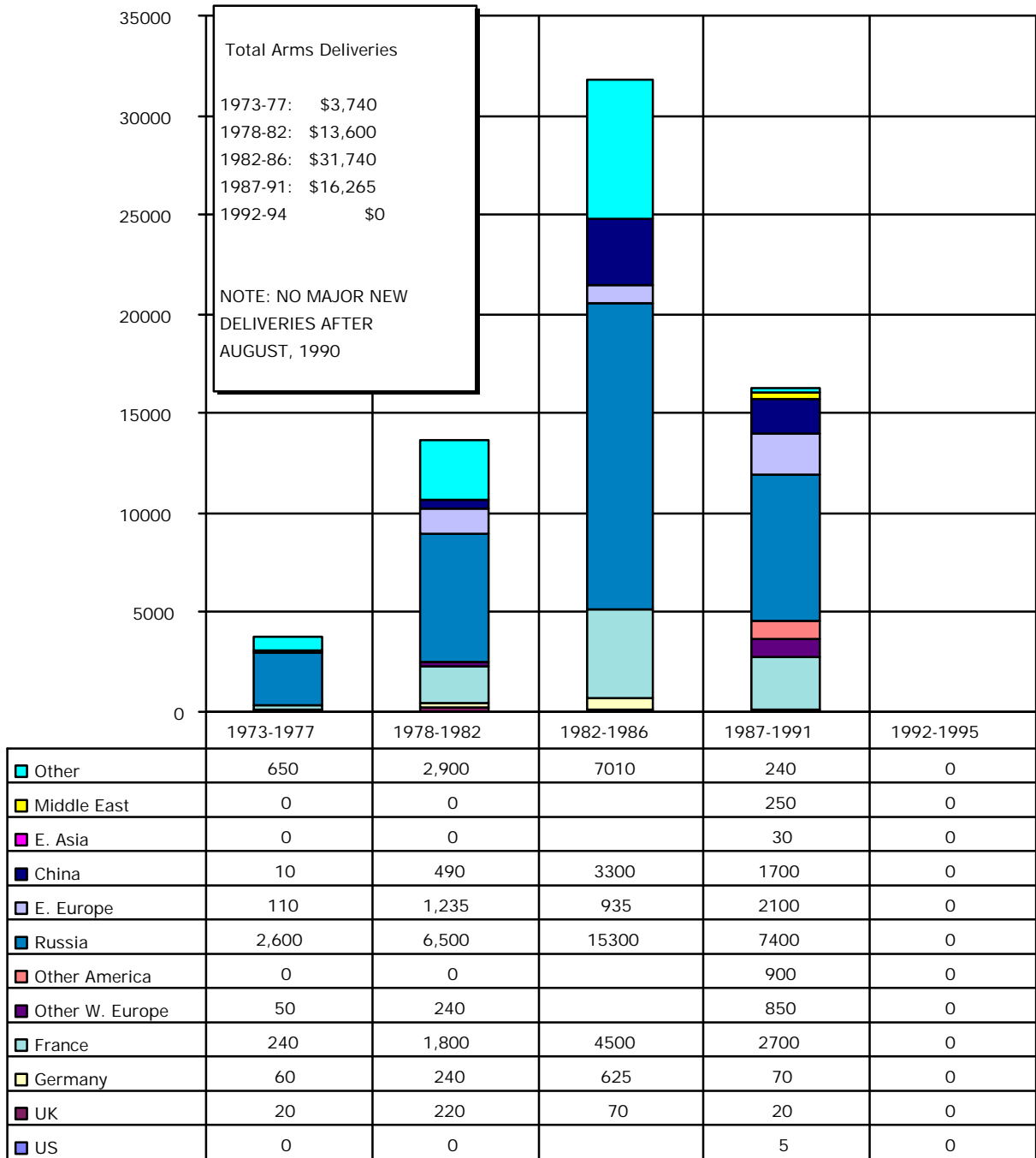
Source: Adapted by Anthony H. Cordesman from US Arms Control and Disarmament Agency, World Military Expenditures and Arms Transfers, GPO, Washington, various editions.

### Iraqi Imports and Exports Relative to Arms Deliveries: 1967-1995 (\$US Current Millions)



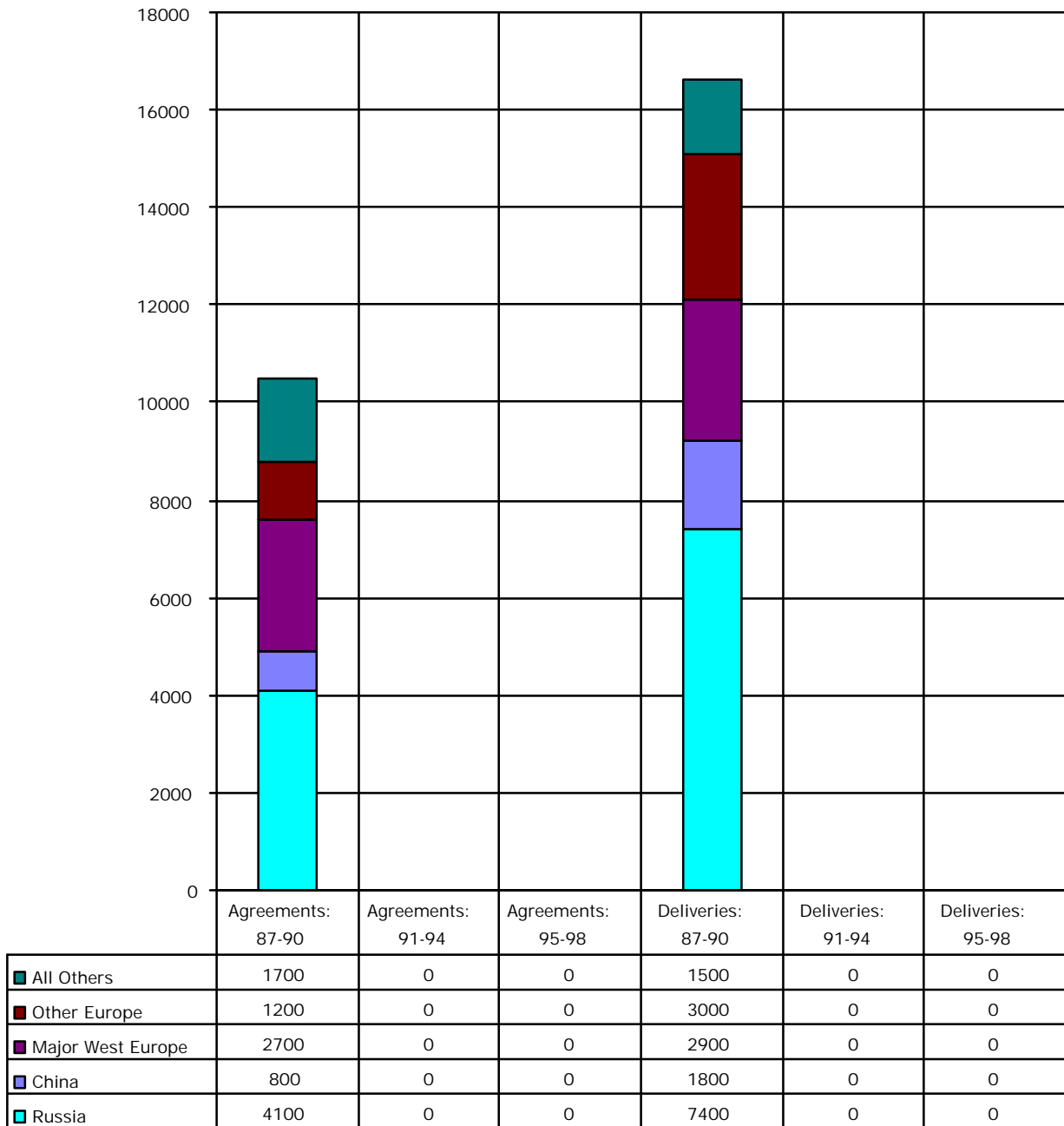
Source: Adapted by Anthony H. Cordesman from ACDA. *World Military Expenditures and Arms Transfers*, Table II, various editions. Iraqi data after 1991 are author's estimate.

### Trend in Deliveries to Iraq by Supplier Country: 1973-1995 (In \$US Current Millions)



Source: Adapted by Anthony H. Cordesman from ACDA, World Military Expenditures and Arms Transfers, various editions.

### Iraqi New Arms Agreements and Deliveries Before and After the Gulf War (Current \$US millions)



Total                                    \$10,500                                    ?    ?                                    \$16,600                                    ?    ?

0 = less than \$50 million or nil, and all data rounded to the nearest \$100 million.

Source: Richard F. Grimmet, Conventional Arms Transfers to the Developing Nations, Congressional Research Service, various editions.

## Iraqi Dependence on Decaying, Obsolete, or Obsolesent 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-25air defense fighters.
- MiG-21 and MiG-25 reconnaissance fighters.
- 15 Hawker Hunters.
- Il-76 Adnan AEW aircraft.
- AA-6, AA-7Matra 530air-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.



## **The Problem of 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.

## 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 Rabiyyah.
- 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).

## **Part Five**

# **The Impact of Lifting Sanctions and Economic Recovery (?)**

## **Iraq's Current Economic Base: CIA and DOE/EIA Estimates**

- Iraq's economy has been dominated by the oil sector, which has traditionally provided about 95% of foreign exchange earnings. In the 1980s, financial problems caused by massive expenditures in the eight-year war with Iran and damage to oil export facilities by Iran led the government to implement austerity measures, borrow heavily, and later reschedule foreign debt payments; Iraq suffered economic losses of at least \$100 billion from the war. After the end of hostilities in 1988, oil exports gradually increased with the construction of new pipelines and restoration of damaged facilities.
- Iraq's seizure of Kuwait in August 1990, subsequent international economic embargoes, and military action by an international coalition beginning in January 1991 drastically reduced economic activity and increased prices. The Iraqi Government has been unwilling to abide by UN resolutions so that the economic embargo could be removed. The government's policies of supporting large military and internal security forces and of allocating resources to key supporters of the regime have exacerbated shortages.
- The implementation of the UN's oil-for-food program in December 1996 has helped improve economic conditions. For the first three six-month phases of the program, Iraq was allowed to export \$2 billion worth of oil in exchange for food, medicine, and other humanitarian goods.
- The UN allowed Iraq to export \$5.2 billion of oil beginning with the fourth phase of the program in May 1998. At an average volume of 1.9 million barrels per day during the last half of 1998, oil exports are about three-quarters their prewar level. Per capita food imports have increased significantly, while medical supplies and health care services are steadily improving. Per capita output and living standards are still well below the prewar level, but any estimates have a wide range of error.
- On December 3, 1999, the U.N. Security Council voted to accept a U.S.-backed 1-week extension (through December 11) in the Iraq "oil-for-food" program. Iraq rejected the one-week extension and said that it would not resume exporting oil at least for the week. Iraq stopped its oil exports (running around 2.3 million barrels per day) on November 22, after the U.N. Security Council adopted only a two-week renewal of the "oil-for-food" program. Exceptions included Jordan as well as oil pumped into storage at the Ceyhan terminal in Turkey. (Ceyhan had 3.5-3.7 million barrels of Iraqi oil in storage as of December 7, 1999).
- The Security Council remains divided between those, like the United States, which hope to use the "oil-for-food" program as leverage to return U.N. weapons inspectors (absent from Iraq since December 1998), and those, like China, France, and Russia, who have been pushing for suspension of sanctions with fewer conditions. On December 4, Iraq threatened that French oil companies (i.e., Elf and Total) would lose "the huge oil investment opportunities they have been granted" if France voted in favor of the U.S.-backed Security Council resolution. On December 10, the Security Council voted unanimously to renew the "oil-for-food" program for another six months. The resolution allows Iraq to export \$5.26 billion worth of oil, and to spend \$300 million on improving the country's oil sector.
- Iraq's Gross Domestic Product (GDP) has been cut sharply since before the Iraqi invasion of Kuwait, with per-capita income (around \$587 in 1999) and living standards far below pre-war levels. On the other hand, Iraq's real GDP growth in 1999 is estimated at 13% (with 17% real growth expected in 2000). In 1999, inflation was estimated at 135%, and unemployment was high as well. Inflation is expected to decline, to 110%, in 2000, and to 60% in 2001, while exports are expected to exceed imports by \$4 billion.
- In June 1999 Iraq attempted to shore up the value of its currency, the dinar, by selling hard currency to the public at near-black-market rates and by encouraging the public to open hard-currency accounts. In July 1999, Iraq established a free-trade zone north of Mosul, in northern Iraq. In November 1999, Iraq reportedly signed three economic and trade agreements with Iran.

## CIA Estimate of Iraq's Current Economic Situation

- **GDP:** purchasing power parity—\$52.3 billion (1998 est.)
- **GDP—real growth rate:** 10% (1998 est.)
- **GDP—per capita:** purchasing power parity—\$2,400 (1998 est.)
- **Inflation rate (consumer prices):** NA%
- **Labor force:** 4.4 million (1989)
- **Labor force—by occupation:** services 48%, agriculture 30%, industry 22% (1989)
- **Unemployment rate:** NA%
- **Industries:** petroleum, chemicals, textiles, construction materials, food processing
- **Industrial production growth rate:** NA%
- **Electricity—production:** 27.6 billion kWh (1996)
- **Electricity—production by source:**
  - *fossil fuel:* 97.83%
  - *hydro:* 2.17%
  - *nuclear:* 0%
  - *other:* 0% (1996)
- **Electricity—consumption:** 27.6 billion kWh (1996)
- **Agriculture—products:** wheat, barley, rice, vegetables, dates, cotton; cattle, sheep
- **Exports:** \$5 billion (1998 est.)
- **Exports—commodities:** crude oil
- **Exports—partners:** Russia, France, China, Turkey (1998)
- **Imports:** \$3 billion (1998 est.)
- **Imports—commodities:** food, medicine, manufactures
- **Imports—partners:** Russia, France, Jordan, Australia, China (1998)
- **Debt—external:** very heavy relative to GDP but the exact amount is unknown (1998)
- **Economic aid—recipient:** \$327.5 million (1995)
- **Currency:** 1 Iraqi dinar (ID) = 1,000 fils
- **Exchange rates:** Iraqi dinars (ID) per US\$1—0.3109 (fixed official rate since 1982); black market rate—Iraqi dinars (ID) per US\$1—1,810 (December 1998), 1,530 (December 1997), 3,000 (December 1995); subject to wide fluctuations
- **Fiscal year:** calendar year

## DOE Estimate of Iraqi Economy

### ECONOMIC OVERVIEW

Currency: Iraqi Dinar (ID)

Unofficial Exchange Rate (11/23/99E): US\$1 = ID1,250

Gross Domestic Product (at market exchange rates) (1999E): \$13.5 billion (one-third of 1989's economic output)

Real GDP Growth Rate (1999E): 13% (2000F): 17%

Inflation Rate (consumer prices) (1999E): 135% (2000F): 110%

Major Export Products (1999): Crude oil and oil products (regulated by the United Nations)

Major Import Products (1999): Food, medicine, consumer goods (regulated by the United Nations)

Merchandise Exports (1999E): \$12.4 billion

Merchandise Imports (1999E): \$8.4 billion

Merchandise Trade Balance (1999E): \$3.9 billion

Current Account Balance (1999E): -\$0.3 billion

Oil Export Revenues/Total Export Revenues (pre-1990): 95%

Total External Debt (1999E): \$132.6 billion (Iraq also owes \$7 billion to Russia for past arms deliveries)

### ENERGY OVERVIEW

Minister of Oil: Lt. Gen. 'Amir Muhammad Rashid

Proven Oil Reserves (1/1/99E): 112.5 billion barrels

Oil Production (January-September 1999 estimated average): 2.66 million barrels per day (MMBD), of which 2.64 million bbl/d is crude oil

Oil Production (9/99E): 2.88 MMBD (of which 2.85 MMBD is crude oil)

Oil Production Capacity (11/99E): 2.8-2.9 MMBD

Projected Oil Production Capacity: Possibly 3.0 MMBD by end of 2000; plans for 3.5 MMBD by the end of 2000; 6 MMBD within 10 years

Oil Export Routes (10/99E): 1 MMBD through the Kirkuk-Ceyhan pipeline; 1.4 MMBD through the port of Mina al-Bakr; 70,000-90,000 bbl/d via truck to Jordan

Oil Consumption (1999E): 450,000-500,000 barrels per day (bbl/d)

Net Oil Exports (10/99E): 2.4 MMBD (including 80,000-90,000 bbl/d to Jordan)

U.S. Oil Imports from Iraq (First 9 months of 1999): 695,000 bbl/d (up from 262,000 bbl/d in 1998 and 48,000 bbl/d in 1997)

Crude Oil Refining Capacity (1/1/99): 347,500 bbl/d (according to Oil and Gas Journal)

Natural Gas Reserves (1/1/99E): 109.8 trillion cubic feet (Tcf)

Natural Gas Production (1998E): 104 billion cubic feet (Bcf)

Natural Gas Consumption (1998E): 104 Bcf

Electricity Generation Capacity (1999E): 6 gigawatts

Electricity Production (1998E): 28.4 billion kilowatthours

### ENVIRONMENTAL OVERVIEW

Total Energy Consumption (1998E): 1.1 quadrillion Btu\* (0.3% of world total energy consumption)

Energy-Related Carbon Emissions (1998E): 19.4 million metric tons of carbon (0.3% of world carbon emissions)

Per Capita Energy Consumption (1998E): 48.7 million Btu (vs U.S. value of 350.7 million Btu)

Per Capita Carbon Emissions (1998E): 0.9 metric tons of carbon (vs U.S. value of 5.5 metric tons of carbon)

Energy Intensity (1998E): 34,800 Btu/ \$1990 (vs U.S. value of 13,400 Btu/ \$1990)\*\*

Carbon Intensity (1998E): 0.63 metric tons of carbon/thousand \$1990 (vs U.S. value of 0.21 metric tons/thousand \$1990)\*\*

Sectoral Share of Energy Consumption (1997E): Transportation (57.4%), Industrial (33.5%), Residential (9.1%)

Sectoral Share of Carbon Emissions (1997E): Transportation (61.5%), Industrial (28.6%), Residential (9.9%)

Fuel Share of Energy Consumption (1998E): Oil (89.1%), Natural Gas (10.3%)

Fuel Share of Carbon Emissions (1998E): Oil (89.9%), Natural Gas (10.2%)

Renewable Energy Consumption (1997E): 7 trillion Btu\*

Number of People per Motor Vehicle (1997): 19.6 (vs U.S. value of 1.3)

Status in Climate Change Negotiations: Iraq is not a signatory to the United Nations Framework Convention on Climate Change or to the Kyoto Protocol.

Major Environmental Issues: Government water control projects have drained most of the inhabited marsh areas east of An Nasiriyah by drying up or diverting the feeder streams and rivers; a once sizable population of Shi'a Muslims, who have inhabited these areas for thousands of years, has been displaced; furthermore, the destruction of the natural habitat poses serious threats to the area's wildlife populations; inadequate supplies of potable water; development of Tigris-Euphrates Rivers system contingent upon agreements with upstream riparian Turkey; air and water pollution; soil degradation (salination) and erosion; desertification

Major International Environmental Agreements: A party to the Law of the Sea and the Nuclear Test Ban. Has signed, but not ratified, Environmental Modification

\* The total energy consumption statistic includes petroleum, dry natural gas, coal, net hydro, nuclear, geothermal, solar and wind electric power. The renewable energy consumption statistic is based on International Energy Agency (IEA) data and includes hydropower, solar, wind, tide, geothermal, solid biomass and animal products, biomass gas and liquids, industrial and municipal wastes. Sectoral shares of energy consumption and carbon emissions are also based on IEA data.

\*\*GDP based on EIA International Energy Annual 1998

## Looking at Iraq's Future as an Energy Exporting State

(These excerpts are based on work done by the DOE/EIA country analysis team)

*Iraq holds more than 112 billion barrels of oil - the world's second largest reserves. Iraq also contains 110 trillion cubic feet of gas, and is a focal point for regional security issues.*

### **GENERAL BACKGROUND**

On December 3, 1999, the U.N. Security Council voted to accept a U.S.-backed 1-week extension (through December 11) in the Iraq "oil-for-food" program. Iraq rejected the one-week extension and said that it would not resume exporting oil at least for the week. Iraq stopped its oil exports (running around 2.3 million barrels per day) on November 22, after the U.N. Security Council adopted only a two-week renewal of the "oil-for-food" program. Exceptions included Jordan as well as oil pumped into storage at the Ceyhan terminal in Turkey. (Ceyhan had 3.5-3.7 million barrels of Iraqi oil in storage as of December 7, 1999). The Security Council remains divided between those, like the United States, which hope to use the "oil-for-food" program as leverage to return U.N. weapons inspectors (absent from Iraq since December 1998), and those, like China, France, and Russia, who have been pushing for suspension of sanctions with fewer conditions. On December 4, Iraq threatened that French oil companies (i.e., Elf and Total) would lose "the huge oil investment opportunities they have been granted" if France voted in favor of the U.S.-backed Security Council resolution. On December 10, the Security Council voted unanimously to renew the "oil-for-food" program for another six months. The resolution allows Iraq to export \$5.26 billion worth of oil, and to spend \$300 million on improving the country's oil sector.

### **OIL**

Iraq contains 112 billion barrels of proven oil reserves, the second largest in the world (behind Saudi Arabia) along with roughly 215 billion barrels of probable and possible resources. Iraq's true resource potential may be understated, as deeper oil-bearing formations located mainly in the Western Desert region could yield additional resources, but have not been explored. Iraqi oil reserves vary widely in quality, with API gravities in the 24o to 42o range. Iraq's main export crudes come from the country's two largest active fields: Rumaila and Kirkuk. The southern Rumaila field produces three streams: Basrah Regular (34o API, 2.1% sulfur); Basrah Medium (30o API, 2.6% sulfur); and Basrah Heavy (22o-24o API, 3.4% sulfur). The northern Kirkuk field produces 37o API, 2% sulfur crude. An additional export crude, known as "Fao Blend," is heavier and more sour, with a 27o API and 2.9% sulfur.

In September 1999, more than 50 foreign companies attended an oil and gas technology exhibition in Baghdad, the first such gathering in 10 years. Most of the firms were from the Canada, France, Italy, and the United Kingdom. No U.S. firms attended, although a high-level Iraqi oil official has stated that Iraq is ready to deal with U.S. oil companies.

### **U.N. Sanctions**

Prior to Iraq's invasion of Kuwait in 1990, Iraq was producing over 3 million barrels/day and exporting 2.8 million barrels/day. Following Iraq's invasion of Kuwait, Iraqi oil exports were prohibited by United Nations (U.N.) Security Council Resolution 661. In April 1995, the U.N. Security Council passed Resolution 986, which allows limited Iraqi oil exports for humanitarian and other purposes. The Iraqi Cabinet formally turned down this offer on April 16, 1995 and not until May 20, 1996 was an agreement signed to allow Iraq to sell \$2 billion worth of oil for food and medical supplies (after deducting a predetermined amount for war reparations to Kuwait and to fund operations of the United Nations Special Commission, or UNSCOM). Implementation of Resolution 986, known as the Iraqi Oil-for-Food program, was frozen on September 1, 1996 because of Iraqi attacks in northern Iraq and Iraqi efforts to renegotiate the accord. Iraq actually began exporting oil under Resolution 986 in December 1996. The Oil-for-Food program requires that half of the Iraqi oil shipments be exported via Turkey to help Turkey regain oil transit revenues that were lost during the ban on Iraqi exports.

Since 1995, the Iraqi Oil-for-Food program has been extended several times, beginning on December 4, 1997. On February 20, 1998, the U.N. Security Council unanimously approved an increase in the amount of oil Iraq may export from \$2.14 billion to \$5.265 billion over a 180-day period. The Iraqi Oil-for-Food program was extended again on March 25, 1998. On November 24, 1998, the U.N. extension also included an allowance of \$300 million for spare parts and other material needed to rebuild Iraq's oil industry to enable it to export the additional oil. Proposals have been made to increase the amount of oil that Iraq could sell even further and to allow direct foreign investment in Iraq's oil sector, but on April 12, 1999 U.S. Deputy Ambassador to the U.N. Peter Burleigh rejected these ideas, stating that it was unnecessary to make deep changes to the program.

Iraqi officials repeatedly have stated their hopes that U.N. Resolution 986 will lead to a complete lifting of all U.N. sanctions against Iraq, and on December 12, 1998 Iraq's Information Minister said that his government hoped that the new six-month



stage of the "Oil-for-Food" program would be the last before a full lifting of sanctions. In anticipation of the eventual complete lifting of sanctions, Iraq already has signed potentially lucrative oil and gas deals with companies from Russia, France, China, and dozens of foreign oil companies from a wide variety of countries have been in discussions with the Iraqi government. In order for the U.N. sanctions to be lifted, Iraq must meet the requirements of U.N. Security Council Resolution 687 (paragraph 22), which provides that the oil embargo will continue until Iraq meets all U.N. conditions, including destruction of all weapons of mass destruction such as nuclear, chemical and biological weapons.

Over the past several years, repeated Iraqi failures to satisfy U.N. conditions have led to confrontations between Iraq and the United Nations. On August 5, 1998, Iraq announced that it was suspending cooperation with UNSCOM and its weapons inspectors in Iraq, and on October 31, 1998 Iraq went even further, vowing to cease all cooperation with U.N. arms inspectors and monitors unless the 8-year-old U.N. embargo were lifted.

Iraqi oil exports are currently continuing even though the U.N. monitor issue has not been settled, and Iraq received a temporary waiver of the requirement to export half of its oil through Turkey.

### **Production**

Following Iraq's invasion of Kuwait and the embargo on Iraqi oil exports, Iraq's oil production fell to around 300,000 bbl/d (from 3.5 MMBD in July 1990). Through the first nine months of 1999, Iraqi crude oil production averaged 2.6 MMBD, up from 1.2 MMBD in 1997 (in October 1999, production reached approximately 2.8-2.9 MMBD). About 450,000-500,000 bbl/d of Iraq's oil output is consumed domestically, with another 70,000-90,000 bbl/d trucked to Jordan under a special U.N. exemption. In late November 1999, Iraq reportedly cut oil production to only 700,000 bbl/d due to a decision to stop oil exports in protest of a U.N. Security Council resolution authorizing only a two-week extension of the "oil-for-food" program.

As of October 1999, around 1.6 MMBD of Iraqi oil production appeared to be coming from southern fields (mainly North and South Rumaila), with an additional 1.26 MMBD from northern fields. Iraq's battle with "water cut" reportedly was impeding progress, especially in the south. In October 1999, oil consulting firm Saybolt International reported that Iraq has been able to increase its oil production through use of short-term techniques not generally considered acceptable in the oil industry.

### **Exports**

U.N. Resolution 986 (originally passed in April 1995) allows Iraq to sell specified dollar amounts of crude oil over six-month periods, in part for the purchase of humanitarian supplies for distribution in Iraq under U.N. supervision. Remaining proceeds are used to pay compensation for Gulf War victims, pipeline transit fees for Turkey, and funding for the U.N. special commission (UNSCOM) that is attempting to dismantle Iraq's capability to produce weapons of mass destruction. On February 20, 1998, the U.N. Security Council voted unanimously (Resolution 1153) to more than double (to \$5.26 billion) the amount of oil Iraq can sell over six month periods. Since then, Iraq has increased its oil exports, and in October 1999 exceeded the \$5.26 billion limit (ultimately reaching \$7.4 billion in sales during the sixth phase of the oil-for-food program which ended on November 20, 1999). On October 4, 1999, the UN Security Council raised the revenue cap to \$8.3 billion. The Security Council also approved a two-week extension of the "oil-for-food" program on November 19, 1999.

For the first nine months of 1999, Iraq averaged crude oil production of around 2.65 MMBD, and net oil exports of around 2.1 MMBD. Besides the 70,000-90,000 bbl/d of this going to Jordan (authorized by the United Nations) and the 450,000-500,000 bbl/d or so consumed domestically, the rest was exported either through the Iraq-Turkey pipeline or the Persian Gulf port of Mina al-Bakr. Although U.N. Resolution 986 mandates that at least half of the "oil-for-food" exports must transit through Turkey, it appears that in recent months more Iraqi oil has been exported via Mina al-Bakr. The volume of Iraqi oil exports has increased in 1999, with exports in October 1999 running close to 2.4 MMBD. Around 40% of Iraqi oil in during the six-month phase of the U.N. oil-for-food deal which ended on November 24 was sold initially to Russian firms. Other large purchasers included French and Chinese companies. Oil was then resold to a variety of oil companies, including U.S.-based.

In October 1999, U.N. Secretary General Kofi Annan endorsed Iraq's request to double its spending cap for oil sector spare parts and equipment under Resolution 1175 of June 20, 1998) for Iraq to spend up to \$300 million repairing oil facilities. As of late October 1999, a total of only 15 spare parts contracts (worth around \$30 million) had been approved by the U.N. sanctions committee under the sixth phase of the "oil-for-food" program. The United States has said that the \$300 million should be used only for short-term improvements to the Iraqi oil industry, and not to make long-term repairs.

In August 1998, Iraq and Jordan signed an agreement for construction of a 100,000-bbl/d pipeline to pump Iraqi crude to the Jordanian refinery at Zarqa instead of transporting the oil via truck. The pipeline could cost \$2 billion. On December 2, 1999, Jordanian and Iraqi energy ministers failed to reach agreement on a new price formula for Iraqi oil exports to Jordan. Currently, Jordan pays a maximum of \$13.50 per barrel, well below the current world oil price, for oil from Iraq (its only source for oil imports).

In addition to U.N.-sanctioned oil exports to Jordan, there have been periodic reports that Iraq has smuggled up to 100,000 bbl/d of crude oil and products via a number of routes. These include: to Turkey via truck, to India and Pakistan along the Gulf coast from Jebel Ali, to Iran across the Fao Peninsula with barges, and to Dubai with the use of small tankers sailing from Umm Qasr. Press reports also have estimated that these illegal shipments may have provided Iraq with as much as \$700 million a year in revenues. It is unclear at present (December 1999) to what extent, if at all, Iraqi oil smuggling continues, although there are reports of smuggling by truck to Turkey and to the southern Persian Gulf. In August 1999, Iraq announced that it would pump \$10 million worth of free oil to Turkey to aid victims of a major Turkish earthquake.

### Oil Revenues

The effect of world oil price fluctuations on Iraq is more complicated than on other OPEC countries for one main reason: Iraq remains subject to U.N. sanctions stemming from its invasion of Kuwait in August 1990. Over the years, these sanctions have constrained both the dollar value that Iraq could export and also have controlled how Iraqi oil export revenues could be spent (in December 1999, the previous limit on Iraqi oil export revenues -- \$5.26 billion per every 6 months -- was ended by the U.N. Security Council, although, for somewhat complex reasons, Iraq has informally, and somewhat vaguely, claimed continued adherence to the limit). Since late 1996, Iraqi oil production has increased by over 2 million bbl/d -- from 550,000 bbl/d in November 1996 to around 2.7 million bbl/d forecast for 2000. Iraqi oil exports reached an estimated 1.5 million bbl/d in April 1998 and around 2.2 million bbl/d in October 1999, before falling off sharply in November and December due to an impasse over U.N. weapons inspections. In 1997 and 1998, rapidly increasing Iraqi oil exports played a significant role in creating a world oil glut and causing a price collapse. Currently, Iraqi oil exports are increasing much more slowly, or have even leveled off, and are expected to average 2.2 million bbl/d for 2000 as a whole.

If Iraq were, for whatever reason, to adhere unilaterally to the old \$5.26-billion, 6-month oil export revenue target, it would need to sustain oil exports of around 1.2 million bbl/d (assuming the \$25 per barrel which EIA expects Iraq will average during 2000). Assuming oil exports of 2.2 million bbl/d for 2000 (EIA's current forecast), Iraq would earn around \$20 billion in oil export revenues, up 79% from 1999 and more than triple 1998 levels. EIA's Iraqi oil production forecast assumes that the country receives sufficient spare parts for its oil industry (a frequent source of contention between Iraq and the United Nations), and also that Iraqi oil production is not capped by the United Nations or restricted by unilateral action by Iraq.

### OPEC Oil Export Revenues at a Glance

	Nominal Dollars (Billions)			Constant \$1990 (Billions)			
	1999E	2000E	Change	1972E	1980E	1986E	2000E
<b>Algeria</b>	\$6.5	\$10.1	56%	\$4.2	\$20.2	\$4.8	\$7.7
<b>Indonesia</b>	\$3.7	\$5.6	52%	\$2.8	\$22.5	\$5.6	\$4.3
<b>Iran</b>	\$13.9	\$21.9	58%	\$12.9	\$20.9	\$6.7	\$16.8
<b>Iraq</b>	\$11.4	\$20.4	79%	\$4.5	\$43.6	\$8.0	\$15.6
<b>Kuwait</b>	\$10.0	\$16.2	62%	\$8.5	\$28.5	\$7.1	\$12.4
<b>Libya</b>	\$7.4	\$11.7	59%	\$9.1	\$35.3	\$5.5	\$9.0
<b>Nigeria</b>	\$12.0	\$18.5	54%	\$6.6	\$38.6	\$7.7	\$14.2
<b>Qatar</b>	\$4.1	\$6.6	61%	\$1.4	\$8.5	\$1.6	\$5.0
<b>Saudi Arabia</b>	\$38.3	\$59.6	55%	\$14.5	\$162.7	\$21.4	\$45.6
<b>UAE</b>	\$11.9	\$19.1	60%	\$3.3	\$29.9	\$6.8	\$14.7
<b>Venezuela</b>	\$13.6	\$21.8	60%	\$9.4	\$28.2	\$7.8	\$16.7
<b>TOTAL</b>	<b>\$132.8</b>	<b>\$211.5</b>	<b>59%</b>	<b>\$77.2</b>	<b>\$439.1</b>	<b>\$83.1</b>	<b>\$162.0</b>

Sources: U.S. Energy Information Administration;

### Oil Field Development, War, and Current Status

Iraq's southern oil industry was decimated in the Gulf War, with capacity falling to 75,000 bbl/d in mid-1991. The largest producing oil field in this region is Rumaila. The war resulted in destruction of gathering centers and compression/degassing stations at Rumaila, storage facilities, the 1.6-MMBD (pre-war capacity) Mina al-Bakr export terminal, and pumping stations along the 1.4-MMBD (pre-war capacity) Iraqi Strategic Pipeline. Seven other sizable fields remain damaged or partially mothballed. These include Zubair, Luhais, Suba, Buzurgan, Abu Ghirab, and Fauqi.

The Kirkuk field, with over 10 billion barrels in remaining proven oil reserves, forms the basis for northern Iraqi oil production. Jambur, Bai Hassan, and Khabbaz are the only other currently-producing oil fields in northern Iraq. An estimated 60% of Northern Oil Company's (NOC) facilities in northern and central Iraq were damaged during the Gulf War. In 1999, production at Kirkuk was estimated at 900,000 bbl/d, with output from all northern fields around 1.26 million bbl/d. In early December 1999, Russian energy company Zarubezhneft said that it was drilling multiple wells in Iraq's Kirkuk oil field, and that this did not violate U.N. sanctions (Russian officials have denied that any work was being done). Zarubezhneft hopes to

boost Kirkuk production capacity from its current 900,000 bbl/d to around 1.1 MMBD. Zarubezhneft also has a contract to drill approximately 100 wells in the North Rumaila field.

With Total's technical assistance, the 11-billion barrel East Baghdad field came online April 1989 following the Iran-Iraq War. This centrally-located field currently produces 50,000 bbl/d of heavy, 23o API oil as well as 30 million cubic feet per day (Mmcf/d) of associated natural gas. Iraq hopes to add additional facilities to boost output to over 150,000 bbl/d. In April 1994, the long-postponed Saddam field development was completed, although there are conflicting reports as to whether the field is currently online. Saddam contains 3 billion barrels of oil and 5 trillion cubic feet (Tcf) of associated gas. Iraq is seeking foreign assistance for a second-phase Saddam development, which would raise oil production capacity from 25,000 bbl/d at present to 50,000 bbl/d, as well as 300 Mmcf/d of gas.

### **The Post-U.N. Sanctions Development Plan**

As of November 1999, Iraq reportedly had signed a number of multi-billion dollar deals with foreign oil companies, mainly from China, France, and Russia (others, including several U.S. firms, also reportedly have held discussions). Russia, which is owed several billions of dollars by Iraq for past arms deliveries, has a \$3.5 billion, 23-year deal with Iraq to rehabilitate Iraqi oilfields, particularly the 15-billion-barrel West Qurna field (located west of Basra near the Rumaila field). Production is to begin once U.N. sanctions are lifted. Since a deal was signed in March 1997, Russia's Lukoil (the operator, heading a Russian consortium plus an Iraqi company to be selected by the Iraqi government) has prepared a plan to install equipment with capacity to produce 100,000 bbl/d from West Qurna's Mishrif formation -- possibly by March 2000. In October 1999, Russian officials reportedly said that Iraq had accepted a Russian request to delay work on West Qurna given the continuation of U.N. sanctions. This followed an Iraqi warning that Lukoil could lose its contract at West Qurna if it did not begin work immediately (Lukoil has been restrained from doing so by U.N. sanctions).

Besides West Qurna, PSCs for the three other large southern oil fields are in various stages of negotiation. The largest of the fields is Majnoon, with reserves of 10-30 billion barrels of 28o-35o API oil, and located 30 miles north of Basrah on the Iranian border. French companies Elf Aquitaine and Total reportedly have negotiated with Iraq on development rights for Majnoon. In the past, it was reported that Elf would retain operatorship and a 40% stake in the \$3-\$4 billion project. Initial output at Majnoon is expected to be 300,000 bbl/d, with later development yielding 600,000 bbl/d or more. Ultimate production potential is estimated at up to 2 MMBD. As of September 1999, Elf and Total reportedly needed only "the stroke of the pen" to complete deals on Majnoon and the 6-billion barrel Nahr Umar field. However, in December 1999, Iraq threatened that the two companies would lose their "preferential treatment" if France did not provide sufficient support to Iraq on the U.N. Security Council.

As with Majnoon, Nahr Umar field was explored and appraised by Braspetro in the mid- to late 1970s. Prior to the Iran-Iraq War, five wells had been drilled. France-based Total apparently has all but agreed with Iraq on development of Nahr Umar. Initial output from Nahr Umar is expected to be around 440,000 bbl/d of 42o API crude, but may reach 500,000 bbl/d with more extensive development.

The 5-billion barrel Halfaya project is the final large field development in southern Iraq. Italian Agip originally drilled four appraisal wells at Halfaya under a service contract in the 1970s. A variety of companies reportedly have shown interest in the field, which could ultimately yield 200,000-300,000 bbl/d in output.

Smaller fields with under 2 billion barrels in reserves also are receiving interest from foreign oil companies. These fields, along with anticipated maximum production levels, include: Nasiriya (250,000 bbl/d); Khormala (100,000 bbl/d); Hamrin (80,000 bbl/d); and Gharraf (100,000 bbl/d). Italy's Agip and Spain's Repsol appear to be strong possibilities to develop Nasiriya.

In addition to the 25 new field projects, Iraq plans to offer foreign oil companies service contracts to apply technology to 8 already-producing fields. This will include new reservoir development at the North and South Rumaila, Zubair, Luhais, Subba, Abu Ghirab, Buzurgan, and Fuqa fields. Iraq also will provide incentives to promote exploration in the remote Western Desert. Located near the Saudi and Jordanian borders, Iraq has identified at least 110 prospects from previous seismic work in this region.

### **Oil Export Pipelines/Terminals**

Much of Iraq's export capability was lost during the Iran-Iraq War, either to war-related damage or due to political reasons. In 1982, for instance, Syria (allied with Iran at the time) closed the 500-mile, 650,000-bbl/d-capacity Baniyas pipeline, which had been a vital Iraqi access route to the Mediterranean Sea and European oil markets. By 1983, Iraq's export capabilities were only 700,000 bbl/d, or less than 30% of operable field production capacity at that time. The respite prior to the Gulf War allowed Iraq to resume oil exports of about 2.8 MMBD (1.6 MMBD via the Kirkuk-Ceyhan pipeline, 800,000 bbl/d via the

IPSA pipelines across Saudi Arabia, 300,000 bbl/d out of Iraq's Mina al-Bakr terminal, and around 100,000 bbl/d by truck through Turkey).

The 600-mile, 40-inch Kirkuk-Ceyhan pipeline is Iraq's largest operable crude export pipeline. This Iraq-Turkey link consists has a fully-operational capacity of 1.1 MMBD, but can handle only around 900,000 bbl/d at present. A second, parallel, 46-inch line has an optimal capacity of 500,000 bbl/d and was designed to carry Basrah Regular exports, but is currently inoperable. Combined, the two parallel lines have an optimal capacity of 1.6 MMBD. Expanding capacity to this level, however, will depend on Iraq's ability to rehabilitate the IT-1 and IT-1A pumping stations, as well as the Zakho metering station near the Iraq-Turkey border and other ongoing pipeline repairs on the 46-inch line. This work appears to be several months behind schedule, and reportedly now is slated to be completed by September 2000. The 40-inch line has additional pumping stations and fewer bottlenecks than the 46-inch line, which allows for greater throughput than that of the larger line. In the Gulf War, both pipelines were disabled when the crucial IT-2 pumping station, located about 93 miles south of the Turkish border, was destroyed. Currently, Iraq is bypassing IT-2, making it more difficult to reach the 1.6 MMBD dual-line capacity. To make IT-2 operational, Iraqi officials have said that they need controls and associated valves costing around \$50 million. The IT-1 pumping station near Kirkuk received lighter damage and is presently functional.

On August 20, 1998, Iraq and Syria (which reopened their border in June 1997 -- after a 17-year closure -- for trade and official visits) signed a memorandum of understanding for the possible reopening of the Baniyas oil pipeline from Iraq's northern Kirkuk oil fields to Syria's Mediterranean port of Baniyas (and Tripoli, Lebanon). In October 1999, Iraqi experts reportedly assessed the pipeline as capable of initial oil pumping capacity of 300,000 bbl/d (out of potential capacity of 1.4 MMBD). The Baniyas pipeline was closed by Syria in 1982 as a way to support Iran during the Iran-Iraq War. Iraq will need U.N. permission to export any oil via Syria.

In order to optimize export capabilities, Iraq constructed a reversible, 1.4-MMBD "Strategic Pipeline" in 1975. This pipeline consists of two parallel 700,000 bbl/d lines. The system allows for export of northern Kirkuk crude from the Persian Gulf and for southern Rumaila crudes to be shipped through Turkey. During the Gulf War, the Strategic Pipeline was disabled after the K-3 pumping station at Haditha as well as four additional southern pumping stations were destroyed. .

In the Persian Gulf, Iraq has three tanker terminals: at Mina al-Bakr, Khor al-Amaya, and Khor al-Zubair. Iraq also has additional dry goods ports at Basrah and at Umm Qasr, which is being outfitted to accommodate crude tankers. Mina al-Bakr is Iraq's largest oil terminal, with four 400,000-bbl/d capacity berths capable of handling very large crude carriers (VLCCs). Gulf War damage to Mina al-Bakr appears to have been repaired in large part and the terminal currently handles 1.3-1.4 MMBD. A full return to Mina al-Bakr's nameplate capacity apparently would require extensive infrastructure repairs. Mina al-Bakr also is constrained by a shortage of separation and storage facilities, most of which were destroyed in the Gulf War.

Iraq's Khor al-Amaya terminal was virtually destroyed in the Iran-Iraq War. Repairs were begun in 1993, and Iraq stated in 1995 that the terminal could load 600,000 bbl/d. Upon full completion of repairs, Iraq projects Khor al-Amaya's capacity will rise to 1.2 MMBD. Iraq's third terminal, Khor al-Zubair, is linked to the Umm Qasr port by a 30-mile long canal. While Khor al-Zubair generally handles dry goods, it has the capability to service small quantities of liquefied petroleum gas (LPG) and refined products. Like Umm Qasr, Khor al-Zubair is being outfitted with crude loading capabilities.

### **Refining**

Iraq's current refining capacity is believed to be around 350,000 bbl/d (although the Iraqis claim 700,000 bbl/d), compared to a pre-Gulf War, nameplate capacity of 700,000 bbl/d. Iraq has 10 refineries and topping units. The largest are the 150,000-bbl/d Baiji North, 140,000-bbl/d Baiji Salaheddin, 126,000-bbl/d Basrah, and 100,000-bbl/d Daura plants. During the Gulf War, both of the Baiji plants in northern Iraq as well as the refineries at Basrah, Daura, and Nasiriyah were severely damaged. Today, a lack of light-end products, low quality gasoline, and rising pollution levels because of a lack of water treatment facilities are some problems faced by Iraq's downstream sector. Post-sanction plans include attracting foreign investment to perform refinery upgrades and building a new \$1-billion, 290,000-bbl/d "Central" refinery near Babylon.

In late October 1999, Iraq's Oil Ministry stated that oil product consumption in Iraq had fallen by at least 15% since prices were raised by up to 50% in September. The September price increase reportedly was initiated by the government to help curtail smuggling, as well as to reduce "irrational use" by consumers. Iraq reportedly has raised gasoline prices twice in 1999 as part of an effort to curb smuggling, although to what effect is unclear, since prices at the pump remain heavily subsidized (only pennies per gallon). Meanwhile, a crackdown on smuggling began in June 1999, with violators facing up to 10 years in prison.

### **NATURAL GAS**

Iraq contains 110 trillion cubic feet (Tcf) of proven natural gas reserves, along with roughly 150 Tcf in probable reserves. About 70% of Iraq's gas reserves are associated gas (gas produced in conjunction with oil), with the rest made up of non-associated gas (20%) and dome gas (10%). Until 1990, all of Iraq's natural gas production was from associated fields. In

1996, Iraq produced slightly more than 128 billion cubic feet (Bcf), down drastically from peak output levels of 700 Bcf in 1979. Within two years after the lifting of U.N. sanctions, Iraq hopes to produce 550 Bcf of gas. Within a decade, Iraq aims to be producing about 4.2 Tcf of gas annually. In October 1997, Iraq invited international partners to invest in natural gas projects worth \$4.2 billion. Generally, Iraq's policy is to award gas and oil concessions to companies from countries supporting the easing or lifting of U.N. sanctions (i.e., France, China, Russia).

Main sources of associated gas are the Kirkuk, Ain Zalah, Butma, and Bai Hassan oil fields in northern Iraq, as well as the North and South Rumaila and Zubair fields in the south. The Southern Area Gas Project was completed in 1985, but was not brought online until February 1990. It has nine gathering stations and a larger processing capacity of 1.5 billion cubic feet per day. Gas gathered from the North and South Rumaila and Zubair fields is carried via pipeline to a 575-Mmcf/d natural gas liquids (NGL) fractionation plant in Zubair and a 100-Mmcf/d processing plant in Basrah. At Khor al-Zubair, a 17.5 million cubic foot LPG storage tank farm and loading terminals were added to the southern gas system in 1990.

Iraq's only non-associated gas production is from the al-Anfal field (200 Mmcf/d of output) in northern Iraq. Al-Anfal production is piped to the Jambur gas processing station near the Kirkuk field, which is 20 miles away. Al-Anfal's gas resources are estimated at 4.5 Tcf, of which 1.8 Tcf is proven.

### **ELECTRIC POWER**

Around 90% of Iraq's national power grid was destroyed in the Gulf War. Existing generating capacity of 9,000 megawatts (MW) in December 1990 was reduced to only 340 MW by March 1991. Roughly 85% of Iraq's 20 power stations were damaged or destroyed in the Gulf War. In early 1991, transmission and distribution infrastructure also was destroyed, including the 10 substations serving Baghdad and about 30% of the country's 400-kilovolt (kV) transmission network. In early 1992, Iraq stated that it had restarted 75% of the national grid, including the 1,320-MW Baiji and Mosul thermal plants as well as the Saddam Dam. In 1998, Iraq's maximum available electric generation capacity was estimated (by Iraq) at around 4,000 MW, with a report in November 1999 indicating that this figure may have increased even further, to 6,000 MW. Iraq is hoping to increase spending on electricity projects by a reported \$306 million. Iraq's Electricity Commission head, Salah Yusuf Qusayr, said in September 1999 that six gas-fired power plants with a total capacity of 222 MW were being imported from China. The units are scheduled to come online in June 2000.

### **OIL AND GAS INDUSTRY**

**Major Companies:** The Oil Ministry oversees the nationalized oil industry through the *Iraq National Oil Company* (INOC). Autonomous companies under INOC include the *State Company for Oil Projects* (SCOP) - design and engineering of upstream and downstream projects; *Oil Exploration Company* (OEC) - exploration; *Northern Oil Company* (NOC) and *Southern Oil Company* (SOC) - upstream activities in northern/central and southern Iraq, respectively; *State Organization for Oil Marketing* (SOMO) - crude oil sales and OPEC relations; *Iraqi Oil Tankers Company* (IOTC); and various departments within the Ministry of Oil which run Iraq's internal pipeline systems, distribute oil products, operate downstream natural gas/LPG projects and gas bottling plants.

**Major Oil Fields (proven/probable reserves - billion barrels, 1998E):** Majnoon (20), West Qurna (15), East Baghdad (11+), Kirkuk (10+), Rumaila (10+), Nahr Umar (6+), Halfaya (5), Zubair (4), Bai Hassan (2), Buzurgan (2), Khabbaz (2), Abu Ghirab (1.5), Nasiriya (2), Khormala (1.5)

**Oil Refineries (effective nameplate capacity bbl/d, 1998E):** Baiji North (150,000), Baiji Salaheddin (140,000), Basrah (126,000), Daura (100,000), Kirkuk (27,000), Nasiriyah (27,000), Haditha, Khanaqin/Alwand, Muftiah, Qayarah (Note: several smaller plants cannibalized for parts to repair larger refineries after Gulf War.)

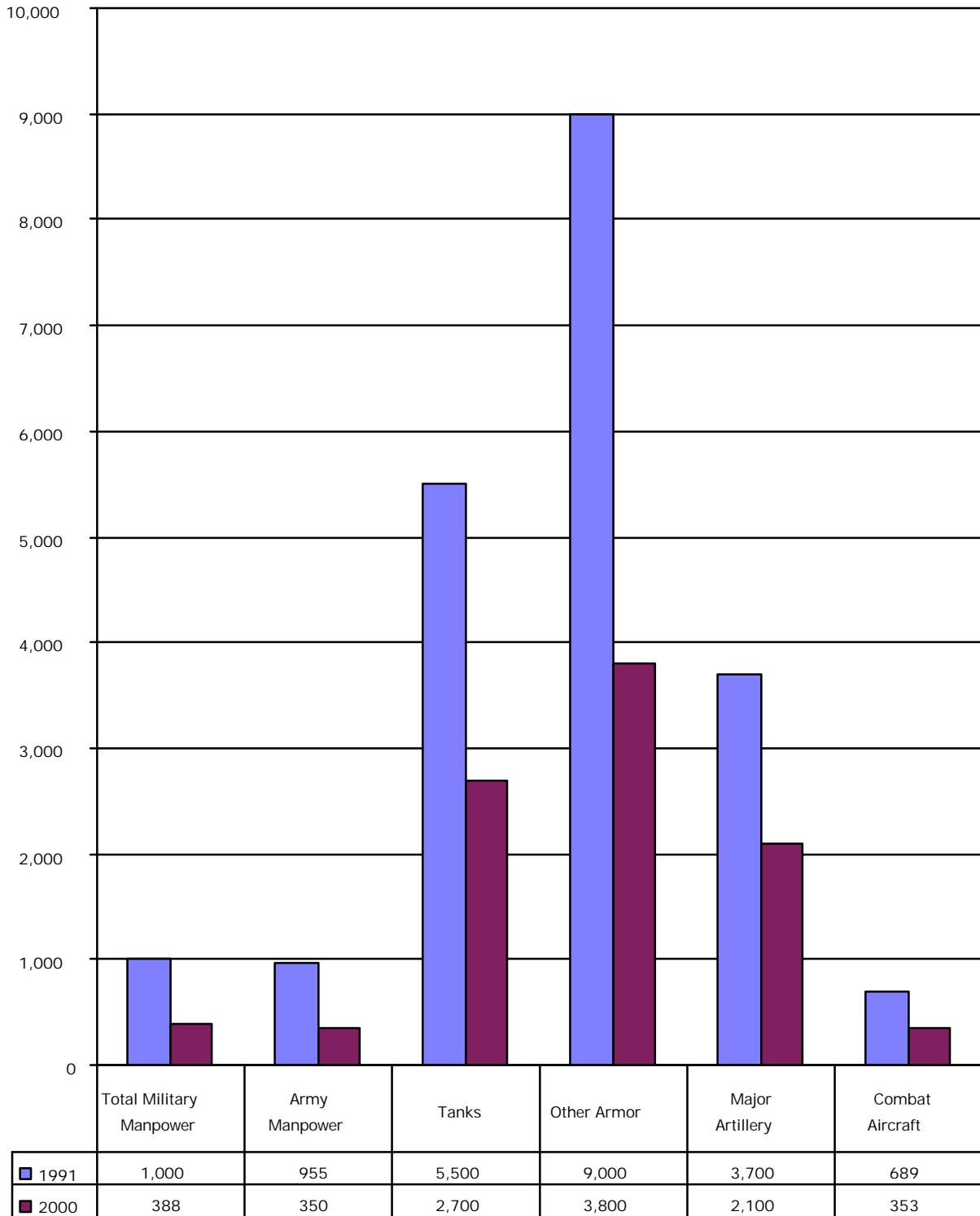
**Major Ports:** Mina al-Bakr, Khor al-Maya, Khor al-Zubair, Umm Qasr

**Major Pipelines (nameplate capacity):** *Kirkuk-Ceyhan (Dortyol) Pipeline* - 0.8-1.6 MMBD; *Iraq-Saudi Arabia Pipeline* (IPSA1, 2) - 1.65 MMBD (Saudi section closed in 1990); *Banias Pipeline* - 1.1-1.4 MMBD (closed by Syria in 1983); *Iraq Strategic Pipeline* - 1.4 MMBD (reversible, internal transportation only)

## The Problem of Future Wealth

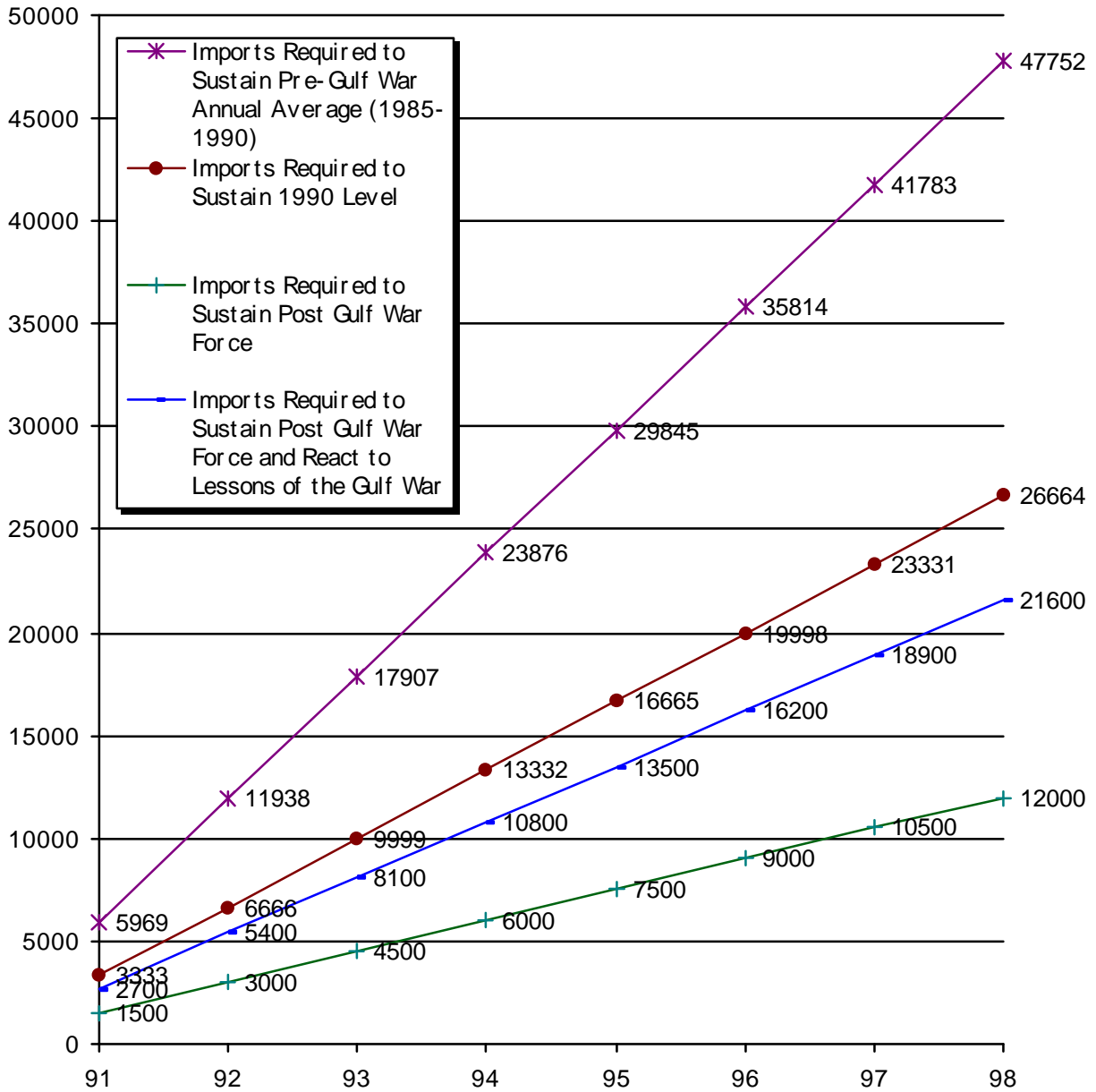
- Iraq seemed to be on the edge of sustained economic development in 1979. It was a nation of 12.8 million people with a per capita income well in excess of \$10,000 in constant \$US 1994. However, its economy was dependent on oil wealth and construction and infrastructure oriented with massive distortions in the state and agricultural sector.
- By 1986, the worst year of the Iran-Iraq War in economic terms, Iraq's per capita income was down to \$2,174, and its population was up to 16.2 million.
- By 1991, the last year for which we have hard data on the Iraqi economy in market terms, Iraq's per capita income was down to \$705, and its population was up to 17.9 million. Iraq's GNP in constant \$1994 had dropped from \$48.3 billion in 1984 to \$16.3 billion.
- Iraq's current per capita income is probably well under \$1,000. The World Bank estimates that its population will climb from 13 million in 1980 to 22.3 million in 1998, 31.3 million in 2005, and 38 million in 2030.
- Iraq's capital holdings in hard currency are probably about 1/18th of the 1980 level.
- Iraq's limited efforts at economic reform have so far been largely offset by authoritarian crack downs, corruption, distortion of rationing, etc., etc.
- The effect of world oil price fluctuations on Iraq is more complicated than on other OPEC countries for one main reason: Iraq remains subject to U.N. sanctions stemming from its invasion of Kuwait in August 1990. Over the years, these sanctions have constrained both the dollar value that Iraq could export and also have controlled how Iraqi oil export revenues could be spent (in December 1999, the previous limit on Iraqi oil export revenues -- \$5.26 billion per every 6 months -- was ended by the U.N. Security Council, although, for somewhat complex reasons, Iraq has informally, and somewhat vaguely, claimed continued adherence to the limit).
- Since late 1996, Iraqi oil production has increased by over 2 million bbl/d -- from 550,000 bbl/d in November 1996 to around 2.7 million bbl/d forecast for 2000. Iraqi oil exports reached an estimated 1.5 million bbl/d in April 1998 and around 2.2 million bbl/d in October 1999, before falling off sharply in November and December due to an impasse over U.N. weapons inspections. In 1997 and 1998, rapidly increasing Iraqi oil exports played a significant role in creating a world oil glut and causing a price collapse. Currently, Iraqi oil exports are increasing much more slowly, or have even leveled off, and are expected to average 2.2 million bbl/d for 2000 as a whole.
- The EIA estimates that Iraqi oil; revenues totalled \$4.5 billion in 1972 in constant \$US 1990 dollars, and rose to \$43.6 billion in 1980, then dropped to \$8.0 billion in 1986. They are estimated at \$15.6 billion in 2000. Iraq earned \$11.4 billion in 1999, in current dollars, and is estimated to earn \$20.4 billion in 2000.
- If Iraq were, for whatever reason, to adhere unilaterally to the old \$5.26-billion, 6-month oil export revenue target, it would need to sustain oil exports of around 1.2 million bbl/d (assuming the \$25 per barrel which EIA expects Iraq will average during 2000). Assuming oil exports of 2.2 million bbl/d for 2000 (EIA's current forecast), Iraq would earn around \$20 billion in oil export revenues, up 79% from 1999 and more than triple 1998 levels. EIA's Iraqi oil production forecast assumes that the country receives sufficient spare parts for its oil industry (a frequent source of contention between Iraq and the United Nations), and also that Iraqi oil production is not capped by the United Nations or restricted by unilateral action by Iraq. Iraq has an authoritarian government which can generate major military spending regardless of the hardship for Iraq's people, but the Iraqi economy will require both the lifting of sanctions and massive sustained structural reform to approach the level of wealth necessary to sustain the 1979-1984 level of military effort.
- The US EIA estimates that Iraqi production capacity will rise from 2.2 MMBD in 1990 and 2.8 MMBD in 1998, to 3.2 MMBD in 2005, 4.2 MMBD in 2010, 5.0 MMBD in 2015, and 6.2 MMBD in 2020.
- Recapitalization and restructuring to react to the lessons of the Gulf War will require levels of spending Iraq could not sustain in near term without crippling recovery and expansion of oil production.
- Past experience indicates that Iraq will be highly inefficient in dealing with the management of the recapitalization and technological restructuring of its forces.
- Resources may well be allocated to weapons of mass destruction.
- Force numbers may be kept too large.

### Iraq's Total Military Machine Before the Gulf War and in 2000



Source: Adapted by Anthony H. Cordesman from the IISS, Military Balance, and material provided by US experts.

### The Iraqi Cumulative Arms Import Deficit Enforced by UN Sanctions (Measured in \$US 97 Constant millions)



Source: Adapted by Anthony H. Cordesman from US Arms Control and Disarmament Agency, World Military Expenditures and Arms Transfers, 1995, GPO, Washington, 1996.



## **The Problem of Restructuring Iraqi Forces**

- Easy to adopt individual changes, but extremely difficult to make rapid or well balanced shift to “system of systems,” combined arms, and joint operations.
- Internal struggles in Iraqi military likely to compound long-standing bureaucratic problems.
- Easy to claim prestige improvements, conduct exercises with impressive names and goals. Far more difficult to execute reality. Surface moves may appear far more effective than actual change.
- Much depends on ability to identify proper lessons, find very wide range of implementable solutions, and then integrate.
- Sudden rash of new arms buys would not lead to major improvements in key war fighting capabilities by 2000, even if sanctions were lifted.
- Past experience indicates that Iraq will be highly inefficient in dealing with the management of the recapitalization and technological restructuring of its forces.
- Most resources may be allocated to weapons of mass destruction.
- Force numbers may be kept too large.
- Internal conflicts and tensions may tie down much of military; loyalty litmus tests will tend to delay or prevent effective military reform.
- Much will depend on strategic and war fighting goals set by Iraq.

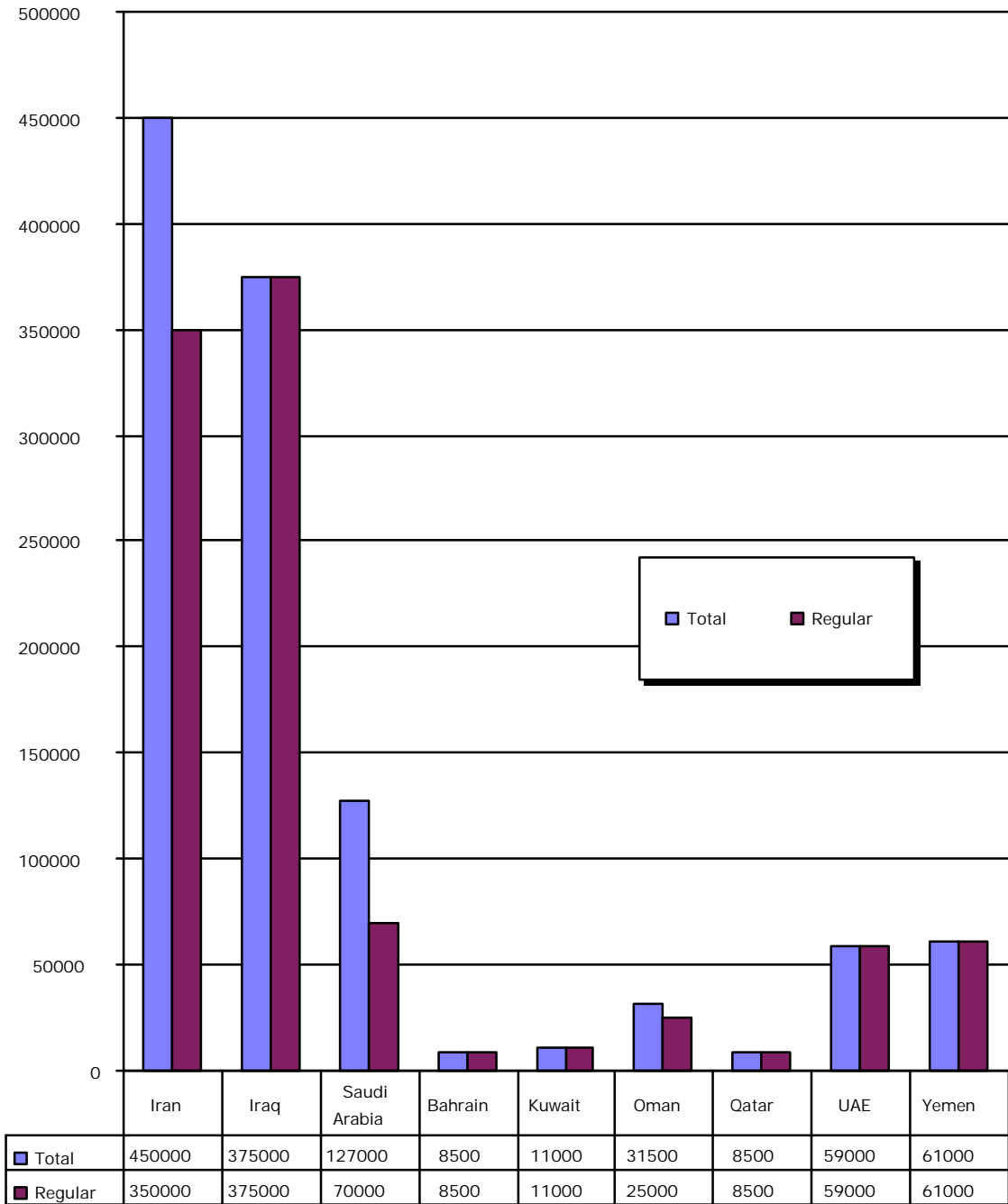
## Possible Iraqi Military Scenarios

- Sudden invasion of Kuwait: Attempt to create “hostage state/people.”
- Repeated movements south towards Kuwait to disrupt Kuwait, force mobilization.
- Creation of biological strike capability, purchase nuclear weapon(s) to intimidate region, seek to decouple US and Saudi Arabia from defense of Kuwait.
- Use of mines or missiles against tanker traffic to Kuwait.
- Desperation strike at Kuwait
- Clashes with Turkey or Iran over Iraqi efforts to attack its Kurds, or support of Kurds hostile to Iraq and Iran.
- Mid-intensity conflict with the US over a major Iraqi attack on the Kurds in the Kurdish security zone.
- War with the Kurds in the Kurdish security zone. Conflict with Iran over Iraqi treatment of the Shi'ites in Southern Iraq, and/or Iranian attacks on the Iraqi front group, the People's Mujahideen.
- Major clash resulting from refusal to allow UN inspection, over challenges to "no-fly zones", and incursions into Kuwait.
- Military confrontation growing out of US or UN attacks in response to Iraqi support of terrorism or use of unconventional warfare.
- Use of chemical or biological terrorism.
- Unconventional attacks on facilities and ships in Gulf.
- Confrontation with Syria over Syrian peace agreement with Israel or some other factor.
- Strike at Jordan
- Wars of “intimidation”
- Other forms of terrorism or proxy wars: Use extremist movements, use Iraq as cover, support “Afghani,” aid Bahraini and Saudi extremists, etc.
- Civil war for power.

# **Part Six**

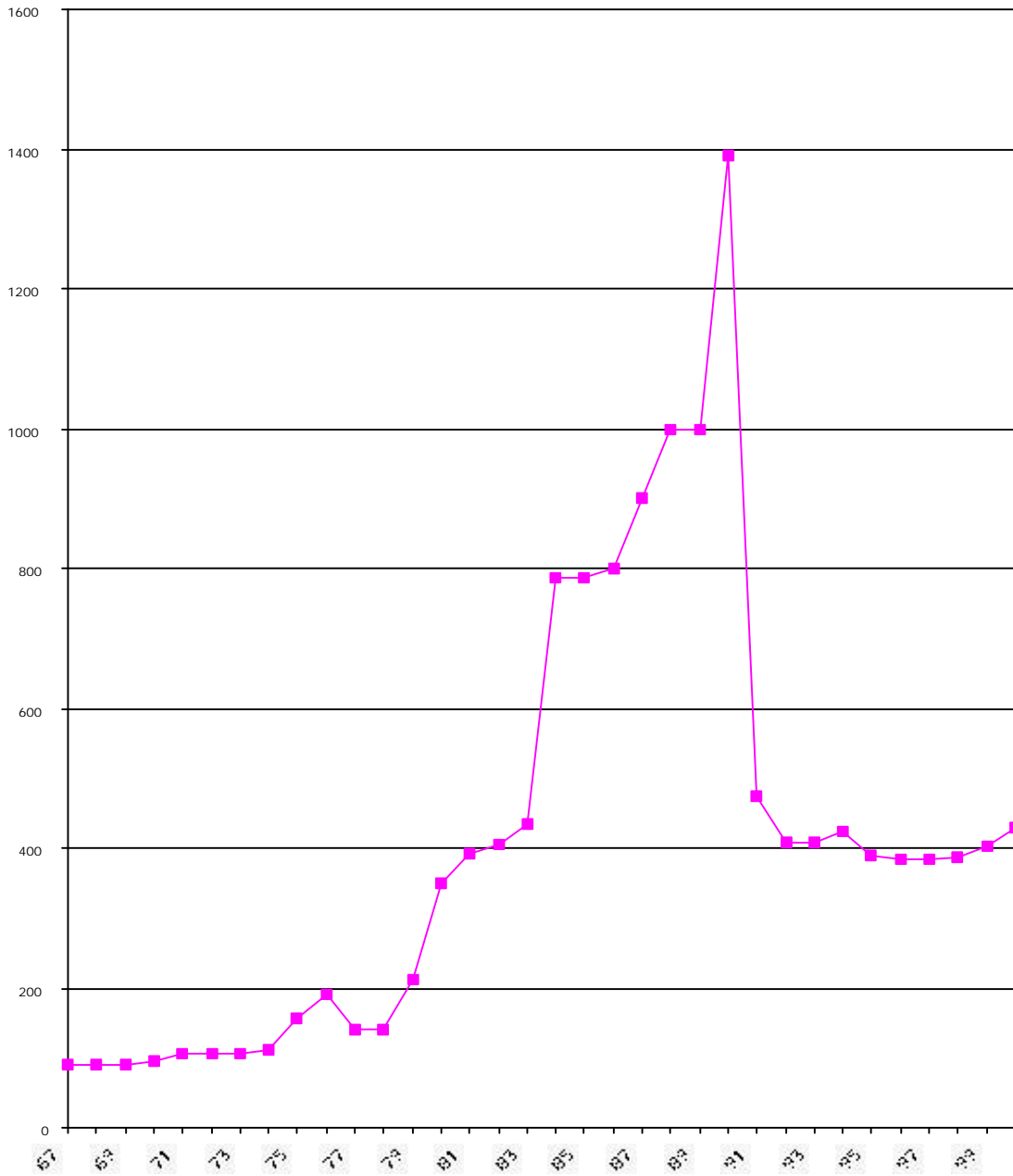
## **Trends in Iraqi Conventional Land Forces**

### Total Active Military Manpower in Gulf Armies in 2000



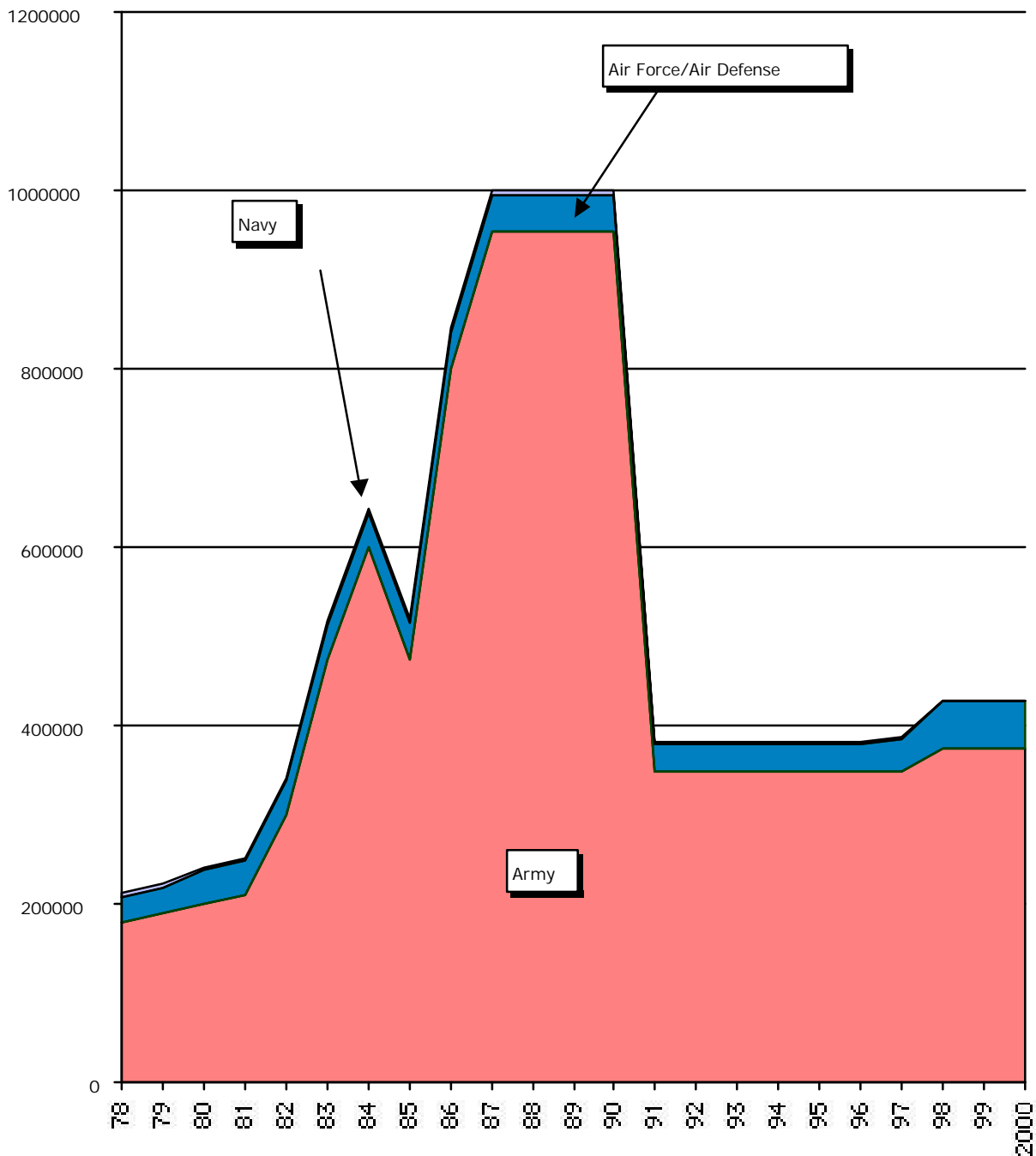
Source: Estimated by Anthony H. Cordesman using data from the IISS Military Balance.

### Iraq: Military Manning - 1967-1998 (1,000s)



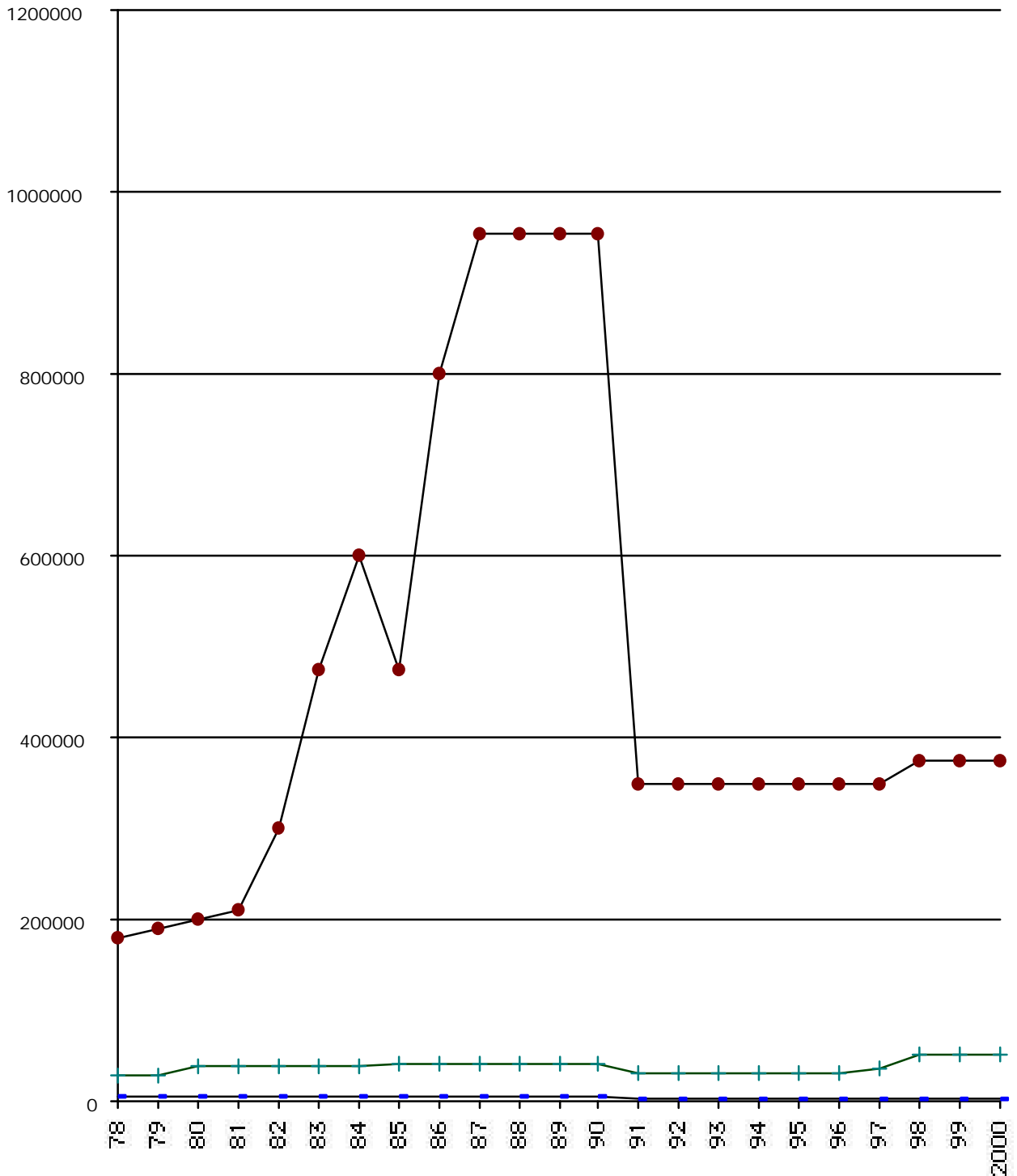
Source: Adapted by Anthony H. Cordesman from ACDA. World Military Expenditures and Arms Transfers, Table I1, various editions, the IISS, Military Balance, and data from US experts.

### Trends in Total Iraqi Military Manpower: 1978-2000



Source: Adapted by Anthony H. Cordesman from various editions of the IISS, Military Balance and interviews with US experts.

### Trends in Iraqi Military Manpower by Service: 1978-1997



Source: Adapted by Anthony H. Cordesman from various editions of the IISS, Military Balance and interviews with US experts.

## **The Problem of Wartime Losses**

- Estimates of losses were sharply reduced as a result of reappraisal after the COW study.
- Iraq does have the capacity to repair/renovate much of its damaged land force equipment.
- Iraq had massive stocks of ammunition and major supplies before 1990. No major reappraisal seems to have been made of USCENTCOM damage estimates after the war.
- Iraq succeeded in reconstituting much of its ground force structure between 1992-1995.
- Air force cannibalization and restructuring far more uncertain.
- Most of SAM/ground based air defense system survived or seems to have been recoverable.
- Iraq has restructured and consolidated its ground forces with an emphasis on the Republican Guard. It has reconstituted much of its surface-to-air missile defense system, and is increasing sortie rates for its remaining aircraft.
- There are, however, severe limits to its recovery capability, and Iraqi spending on such activity seems to have decline steadily since late 1994.
- The quality and sustainability of many Iraqi efforts will also be highly uncertain. Life-span of complex missiles and electronics very difficult to estimate. LRU-type losses are difficult to calculate, and NSA has miserable history of analysis in this area.
- Past experience indicates that Iraq will be highly inefficient in dealing with the management of the recapitalization and technological restructuring of its forces.
- Most resources may well be allocated to weapons of mass destruction.
- Force numbers may be kept too large to allow efficient consolidation and recovery.

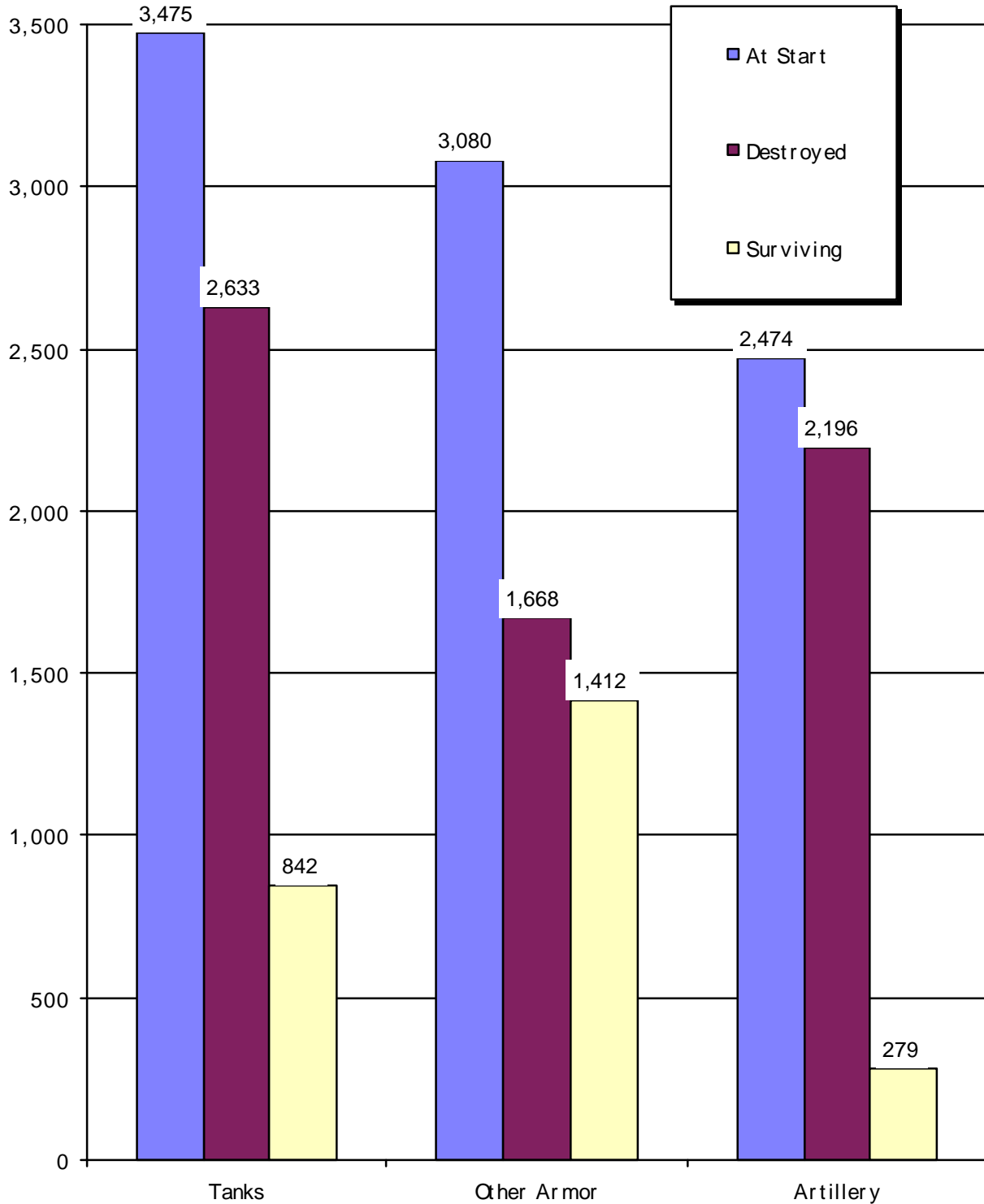


## **The Impact of Coalition Air and Land Forces on Iraqi Equipment Strength in the Kuwaiti Theater of Operations (KTO) at the Time of the Cease-Fire**

	<u>Tanks</u>	<u>APCs</u>	<u>Artillery</u>
Total in KTO on January 16, 1991, at start of Air Campaign (Imagery)	3,475	3,080	2,474
Total left at beginning of the land campaign	2,087	2,151	1,322
Total destroyed or abandoned during the during land campaign (USCENTCOM estimate)	2,159	521	1,465
Destroyed by air	(451)	(224)	(353)
Destroyed by land or abandoned	(1,708)	(297)	(1,112)
Total destroyed or abandoned during the during land campaign (Imagery Based)	1,245	739	1,044
Total destroyed during air campaign and land offensive (Imagery Based)	2,633	1,668	2,196
Still in Iraqi Control on March 1, 1991 (Imagery)	842	1,412	279

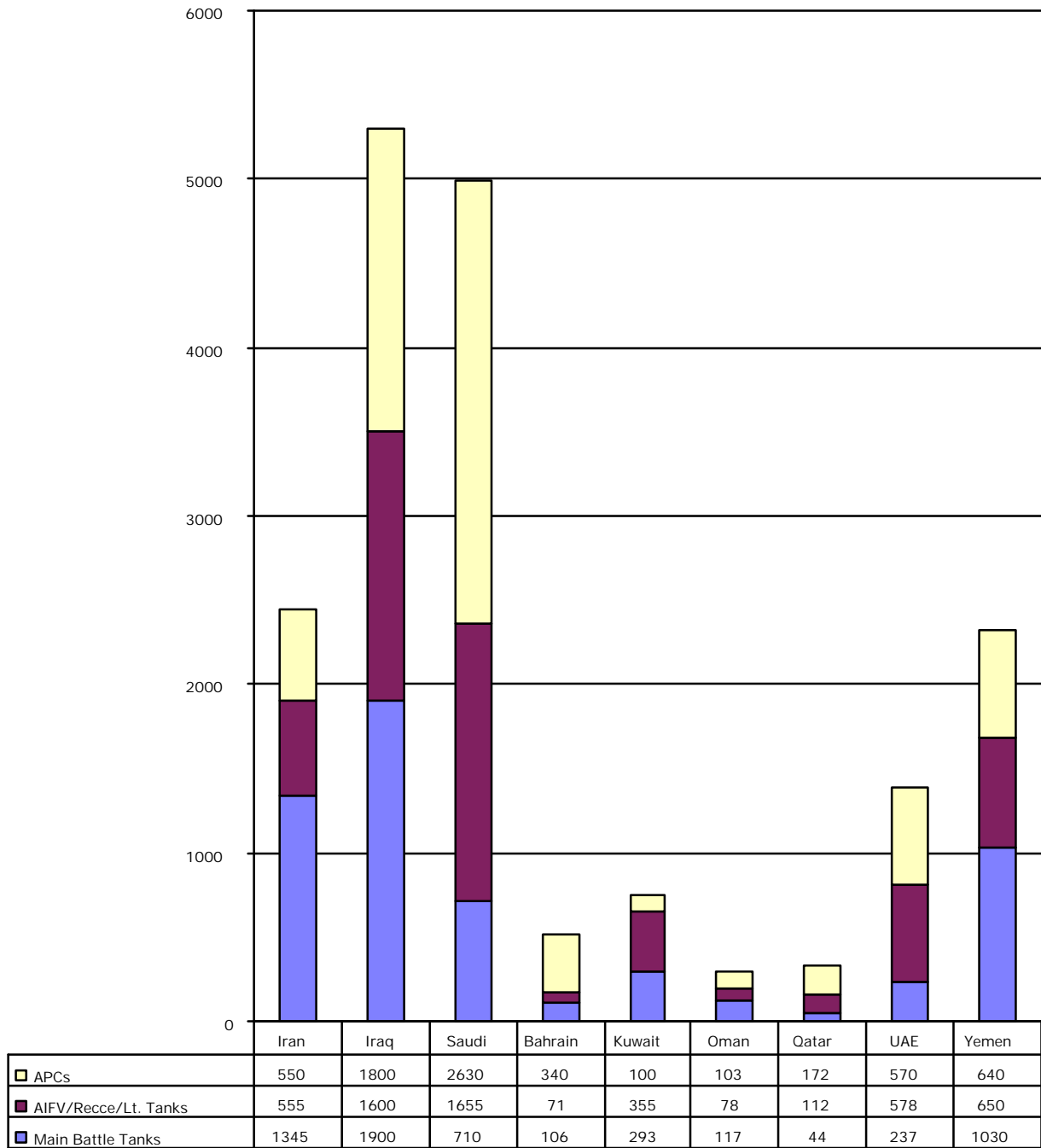
Source: Adapted by Anthony H. Cordesman from interviews and work by Eliot Cohen, ed., Gulf War Air Power Survey, Volume II, Section II, pp. 259-261 and interviews.

### What We Really Destroyed: Corrected Intelligence Estimates of The Iraq Military Forces in the Kuwaiti Theater of Operations Before and After the Gulf War



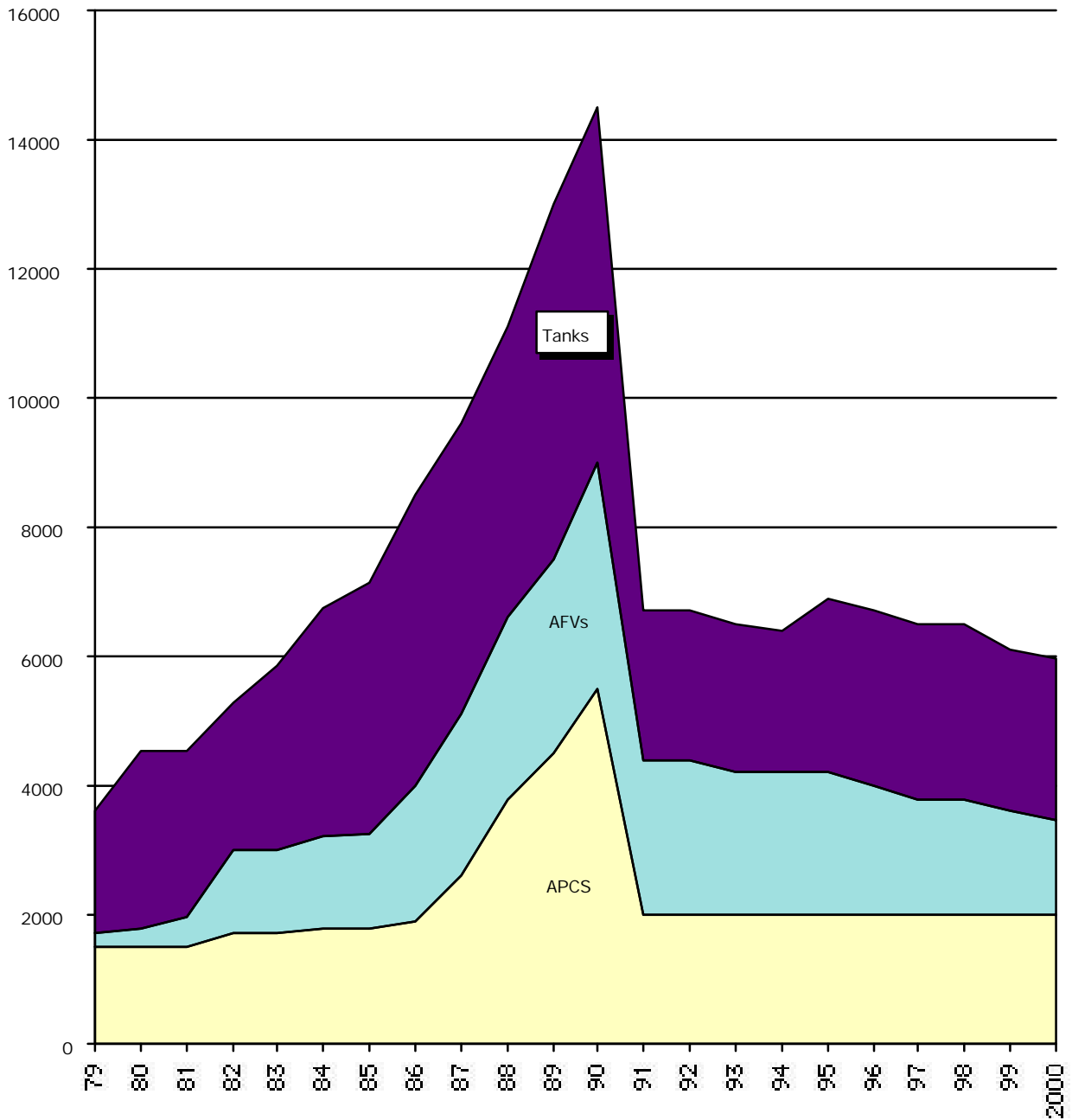
Source: Adapted by Anthony H. Cordesman from the [IISS, Military Balance](#), and material provided by US experts.

### Total Gulf Operational Armored Fighting Vehicles - 2000



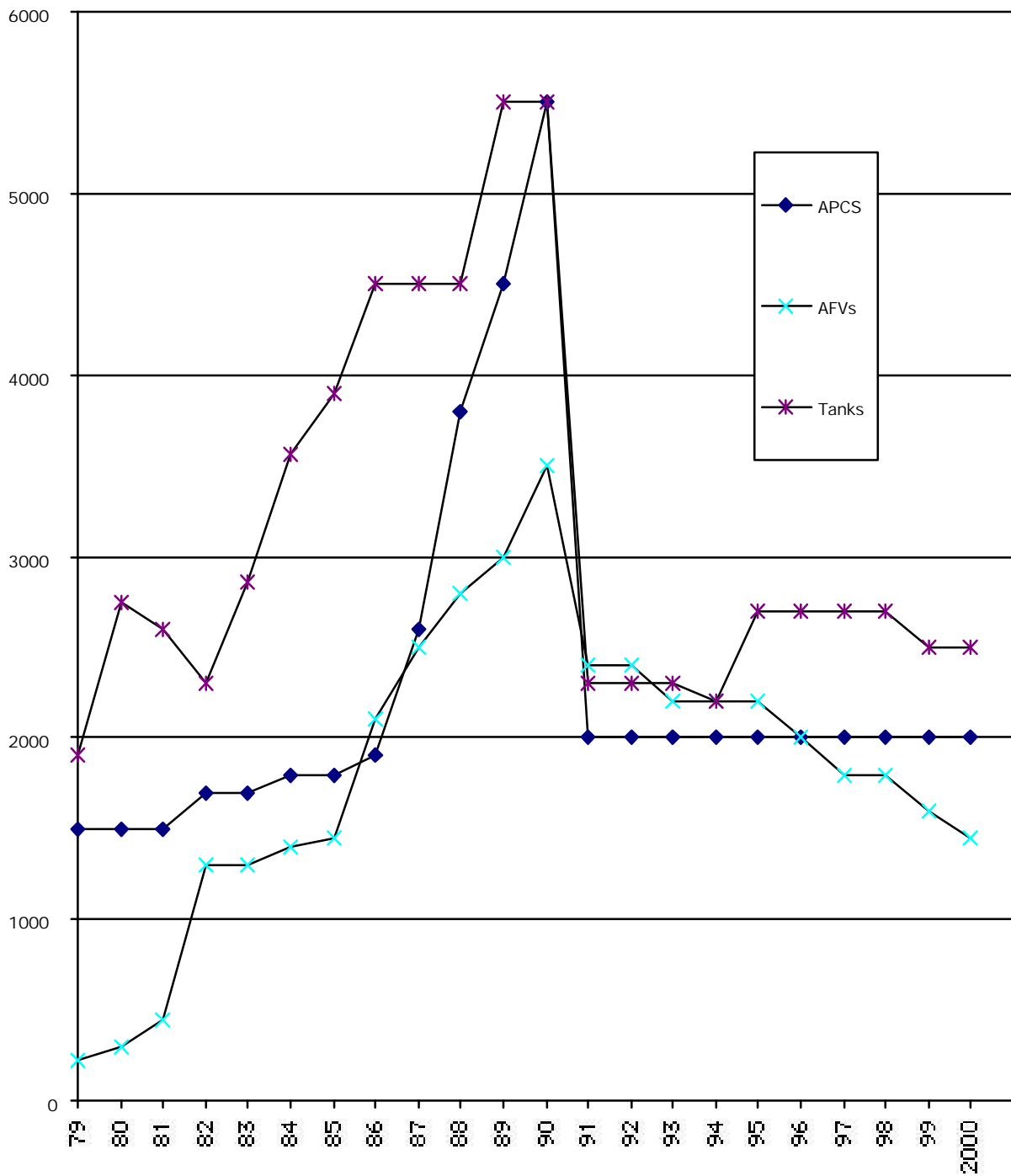
Source: Estimated by Anthony H. Cordesman using data from various editions of the IISS Military Balance, and Jane's Sentinel.

### Total Iraqi Armored Weapons Strength - 1979 to 2000



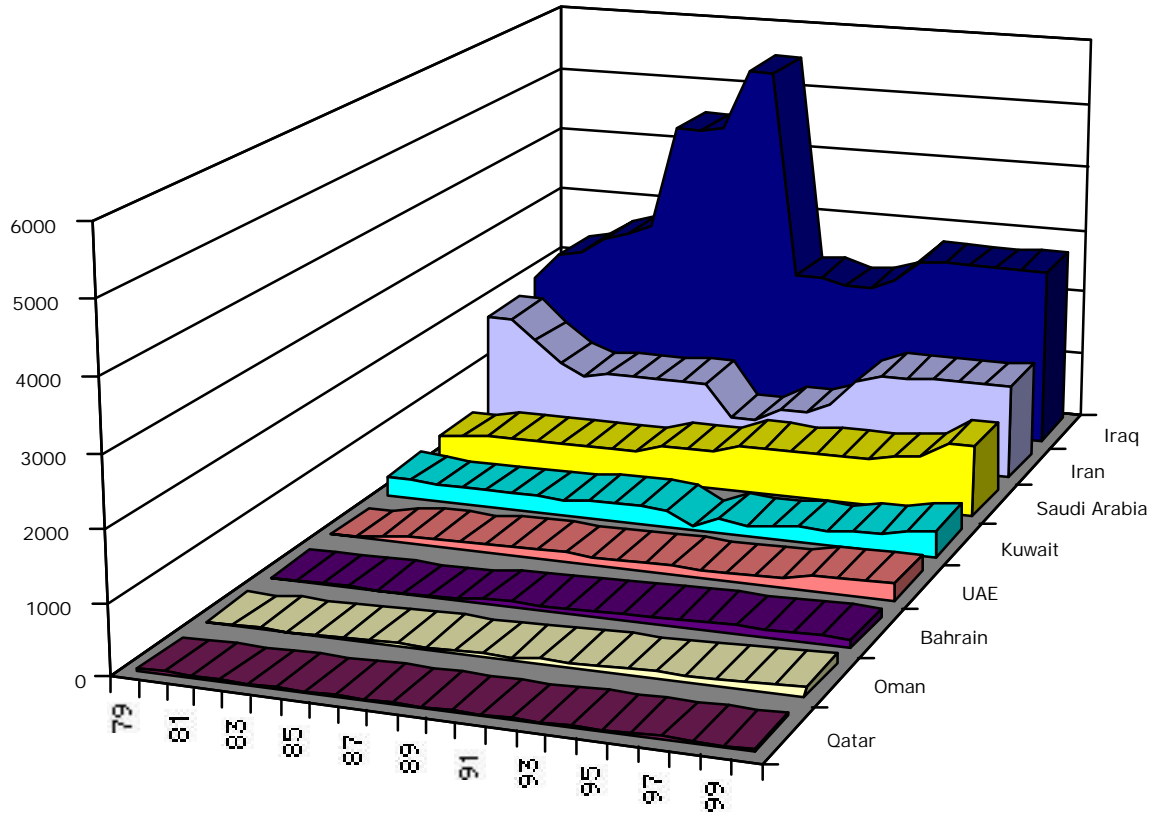
Source: Adapted by Anthony H. Cordesman from various editions of the IISS, Military Balance, the JCSS, Military Balance in the Middle East, and material provided by US experts.

### Iraqi Armored Weapons Strength by Type - 1979 to 2000



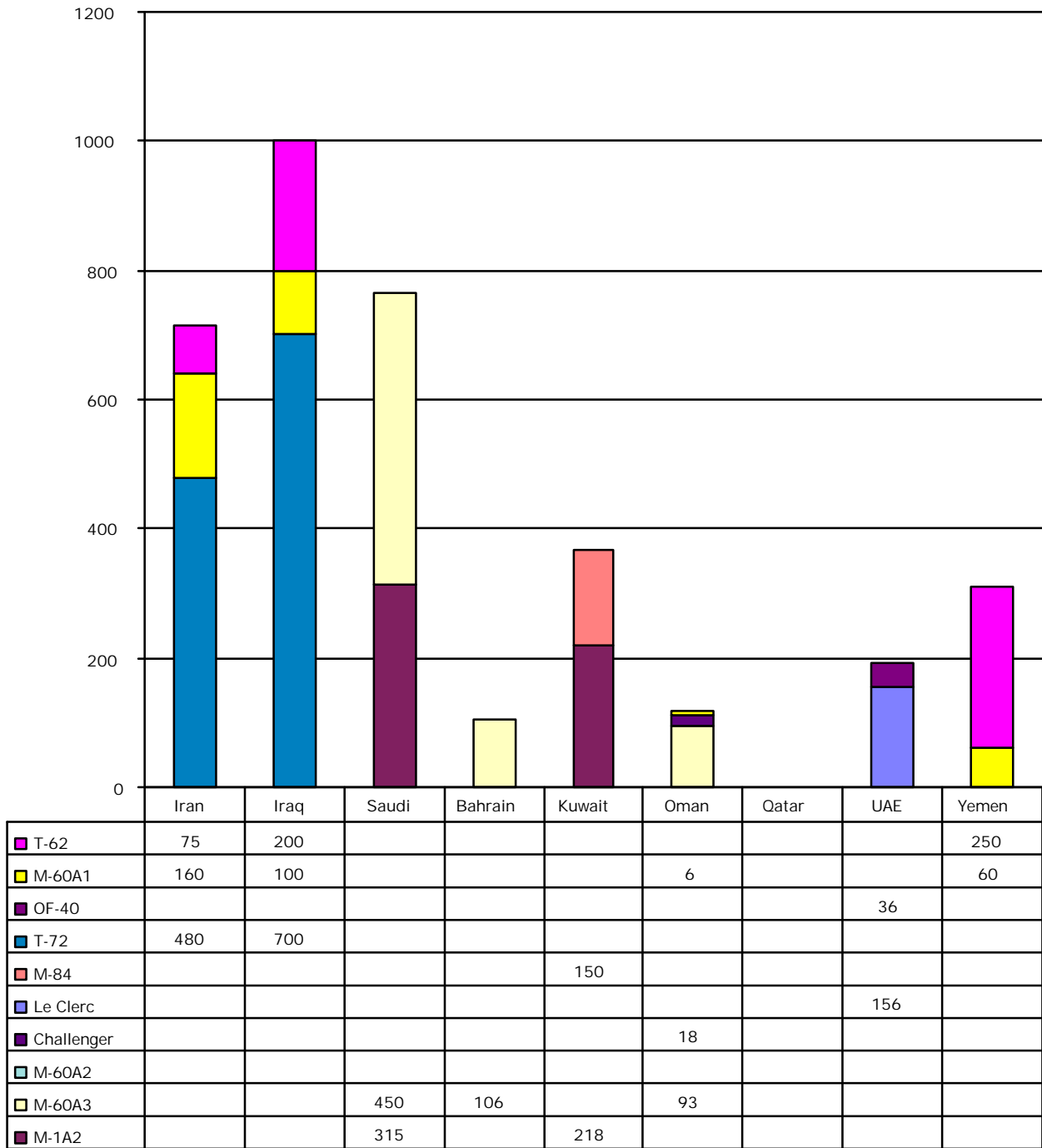
Source: Adapted by Anthony H. Cordesman from various editions of the IISS, Military Balance, the JCSS, Military Balance in the Middle East, and material provided by US experts.

### Trends in Total Gulf Main Battle Tank Inventory: 1979-2000



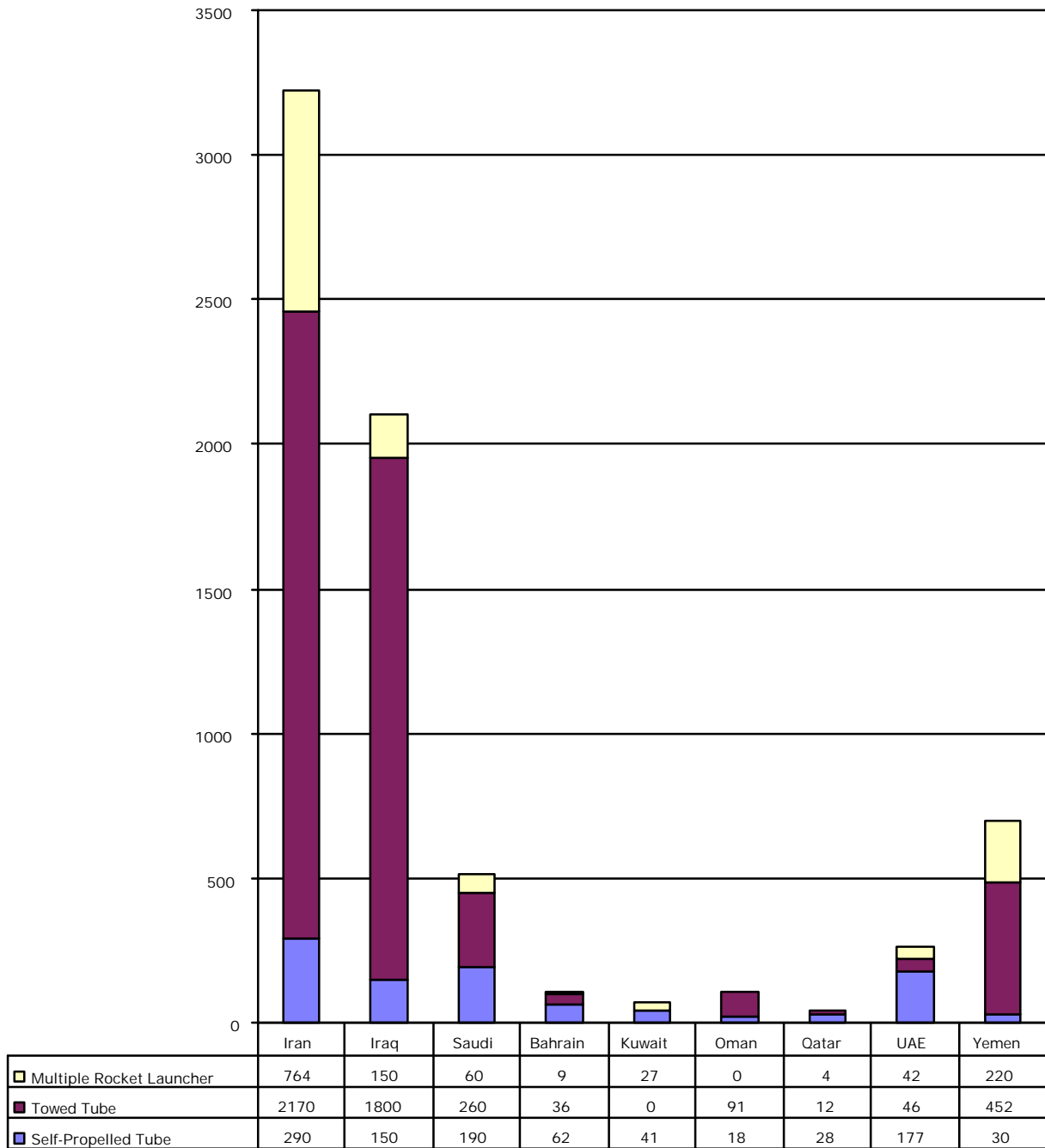
	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	0
■ Qatar	12	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	34	34	34	44
■ Oman			18	18	18	26	33	39	39	39	39	39	82	78	73	73	91	91	97	117	141	141
■ Bahrain									60	60	54	54	81	81	81	106	106	106	106	106	106	106
■ UAE			75	118	118	118	136	136	136	136	131	131	131	131	125	125	133	133	231	231	231	237
■ Kuwait	280	280	240	240	240	240	240	240	260	275	275	245	36	200	150	164	220	198	249	249	341	385
■ Saudi Arabia	350	380	430	450	450	450	450	450	450	550	550	550	700	700	696	700	700	700	765	810	1055	1055
■ Iran	1735	1735	1410	1100	940	1000	1000	1000	1000	1000	500	500	700	700	850	1245	1390	1390	1410	1410	1410	1410
■ Iraq	1900	2300	2360	2600	2750	2900	4500	4500	4560	5500	5500	2300	2300	2200	2200	2350	2700	2700	2700	2700	2700	2700

### Medium to High Quality Main Battle Tanks By Type in 2000



Source: Adapted by Anthony H. Cordesman from the IISS, Military Balance.

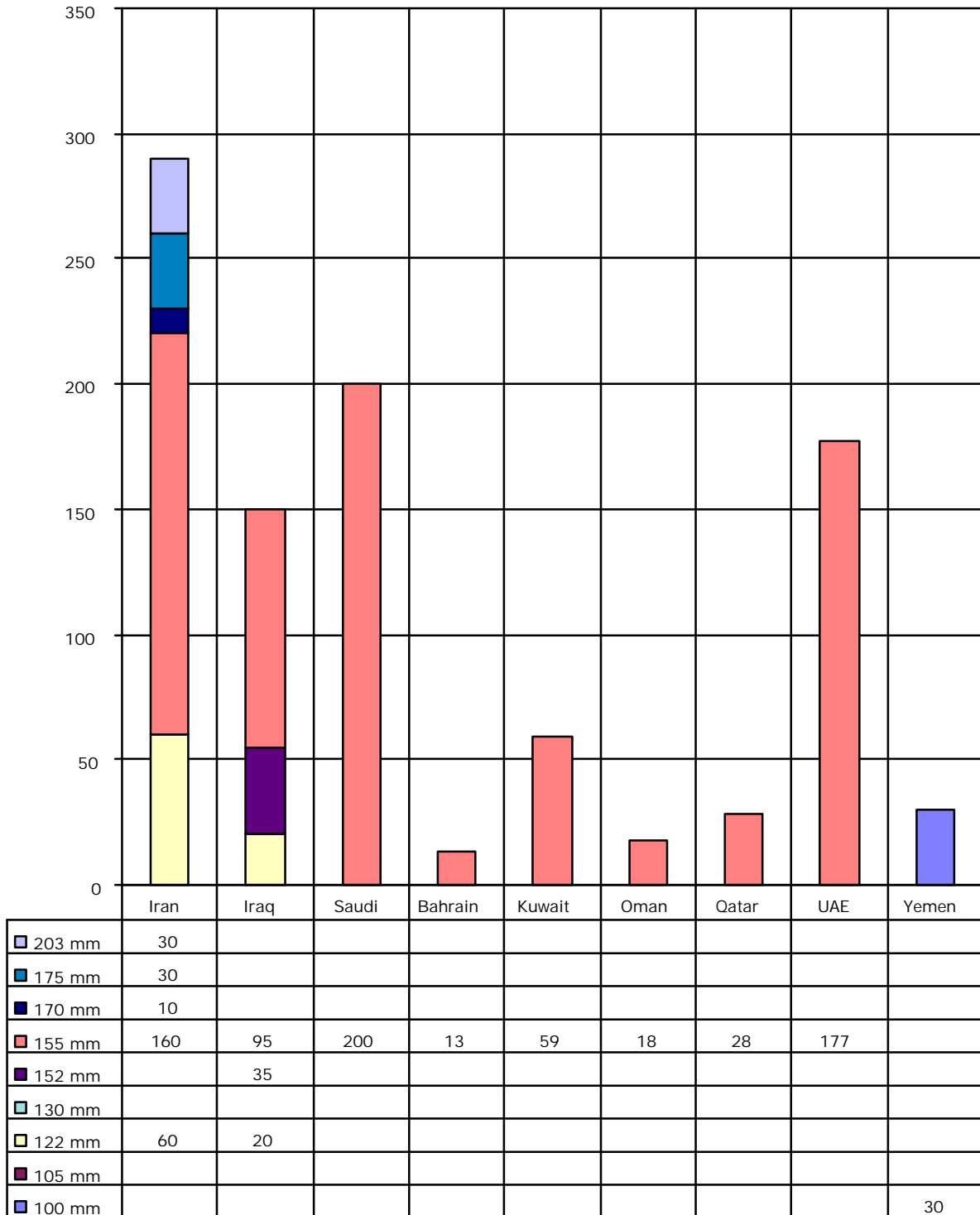
### Total Operational Gulf Artillery Weapons - 2000



Source: Estimated by Anthony H. Cordesman from various sources and the IISS, Military Balance.

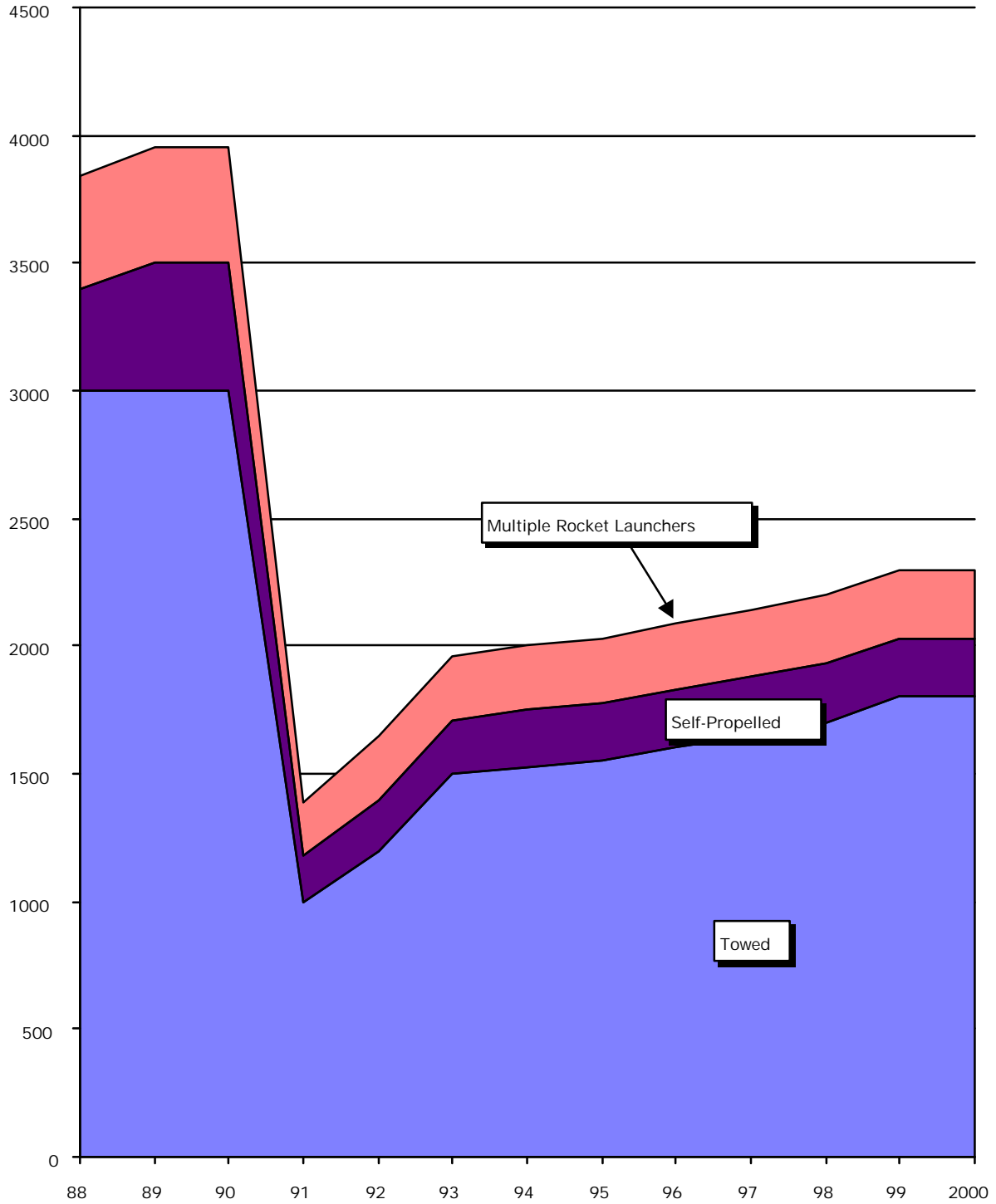


### Gulf Inventory of Self-Propelled Artillery by Caliber in 2000



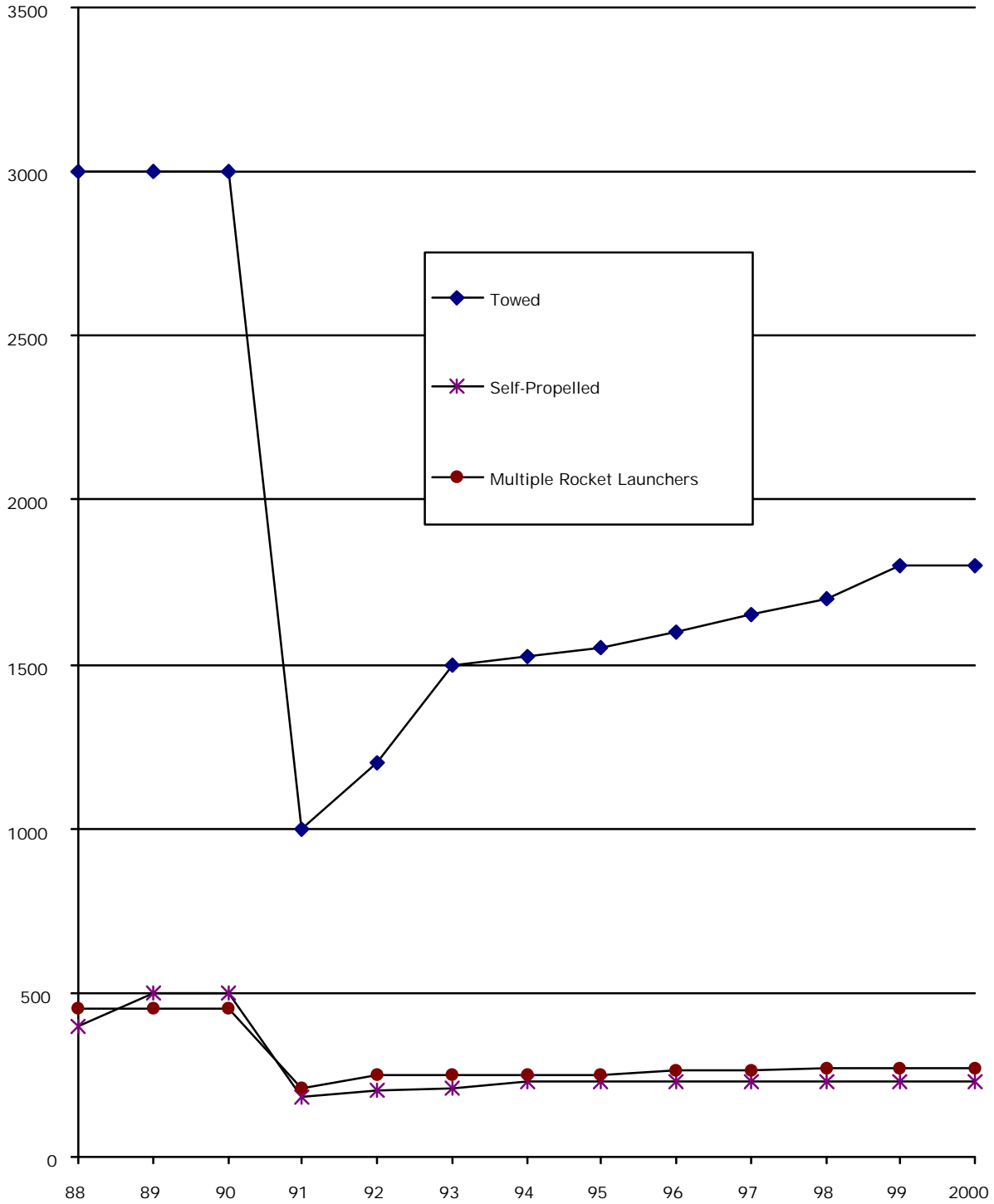
Source: Prepared by Anthony H. Cordesman, based upon discussions with US experts.

### Total Iraqi Artillery Weapons Strength - 1988 to 2000



Source: Adapted by Anthony H. Cordesman from various editions of the IISS, Military Balance, the JCSS, Military Balance in the Middle East, and material provided by US experts.

### Iraqi Artillery Weapons Strength by Type - 1988 to 2000



Source: Adapted by Anthony H. Cordesman from various editions of the IISS, Military Balance, the JCSS, Military Balance in the Middle East, and material provided by US experts.

# **Part Seven**

## **Trends in Iraqi Conventional Air Forces**

## Iraqi Air Strength in Desert Storm

### Element of Force Strength

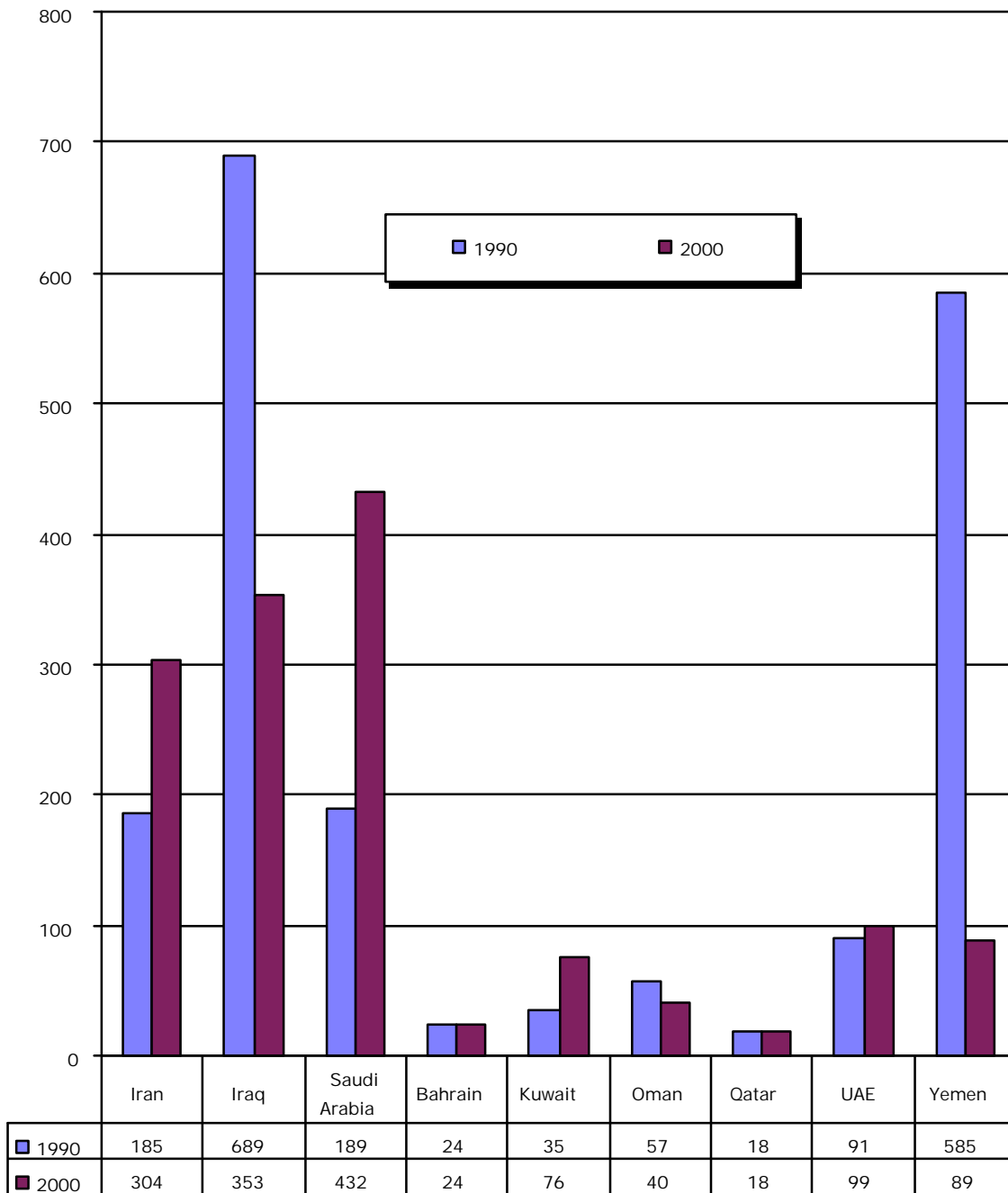
	August 1, <u>1990</u>	January 1, <u>1991</u>	February 1 <u>1991</u>	April 1, <u>1991</u>
<u>Air Force</u>				
Personnel	18,000	18,000	18,000	18,000
Fighters/fighter bombers	718	728	699	362
Bombers	15	15	9	7
Reconnaissance	<u>12</u>	<u>12</u>	<u>12</u>	<u>0</u>
Subtotal	745	755	720	369
Combat capable trainers	<u>370</u>	<u>400</u>	<u>400</u>	<u>252</u>
Total	1,115	1,155	1,120	621
Helicopters	517	511	511	481
Transports	76	70	70	41
Civil Transports	59	60	60	42
<u>Air Defense Force</u>				
Personnel	17,000	17,000	17,000	17,000
Surface-to-air missile Batteries	120	120	200	85
Anti-aircraft guns	7,500	7,600	7,600	5,850

### Iraqi Combat Aircraft Losses in Desert Storm

<u>Aircraft Types</u>	<u>Number on</u> <u>January 12, 1991</u>	<u>Lost in</u> <u>Air Combat</u>	<u>Total</u> <u>Destroyed</u>	<u>Fled To Iran</u>	<u>Remaining on</u> <u>March 1, 1991</u>
Mirage F-1	75	8	10	30	35
Su-24 Fencer	25	0	2	14	9
MiG-29 Fulcrum	41	5	9	7	25
Su-7/17/20/22 Fitter	119	5	14	34	71
MiG-25 Foxbat	33	2	8	0	25
Su-25 Frogfoot	61	2	4	7	50
MiG-23 Flogger	123	8	17	10	96
MiG 21 Fishbed	<u>208</u>	<u>4</u>	<u>16</u>	<u>0</u>	<u>192</u>
TOTAL	685	34	80	102	503

Source: Adapted by the author from Lt. General Walter E. Boomer, "Desert Storm, MARCENT Operations in the Campaign to Liberate Kuwait," US Marine Corps Headquarters, August 31, 1991, and Eliot Cohen, ed., Gulf War Air Power Survey, Volume V, Part I, pp. 17-19 and 653-654.

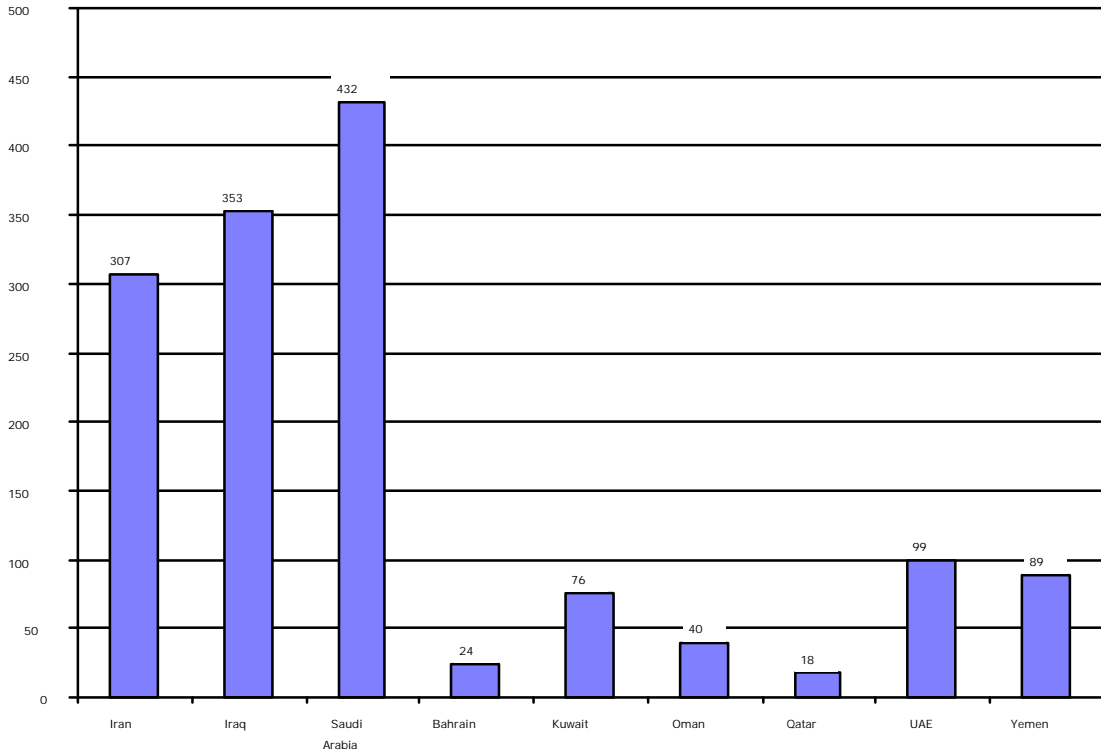
### Total Operational Combat Aircraft in All Gulf Forces 1990-2000



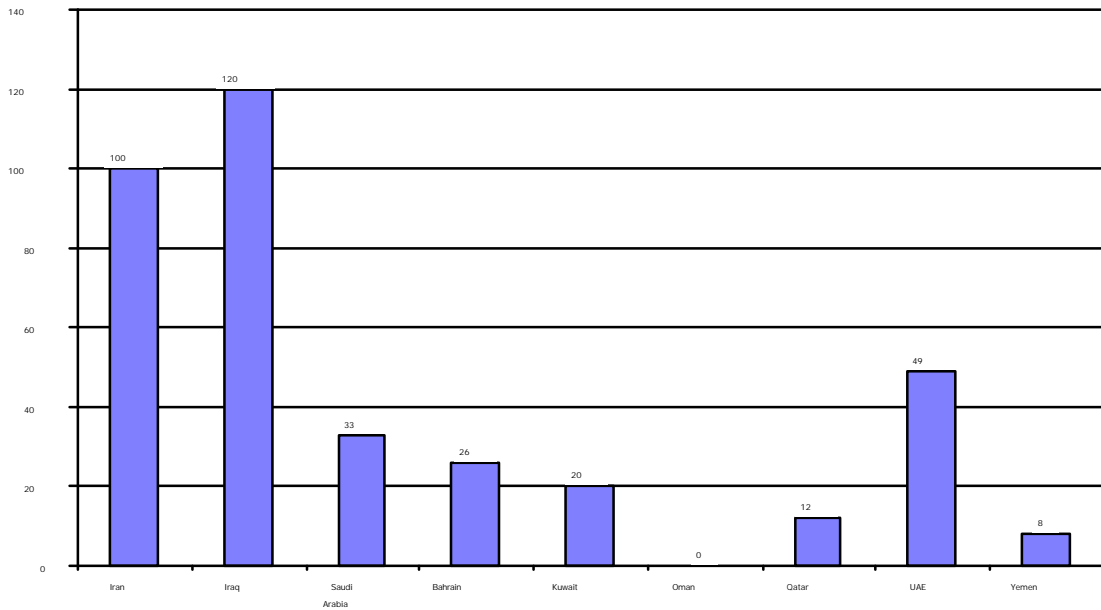
Adapted by Anthony H. Cordesman from various sources and the IISS, Military Balance.

### Total Gulf Holdings of Combat Aircraft – 2000

#### Fixed Wing Combat Aircraft

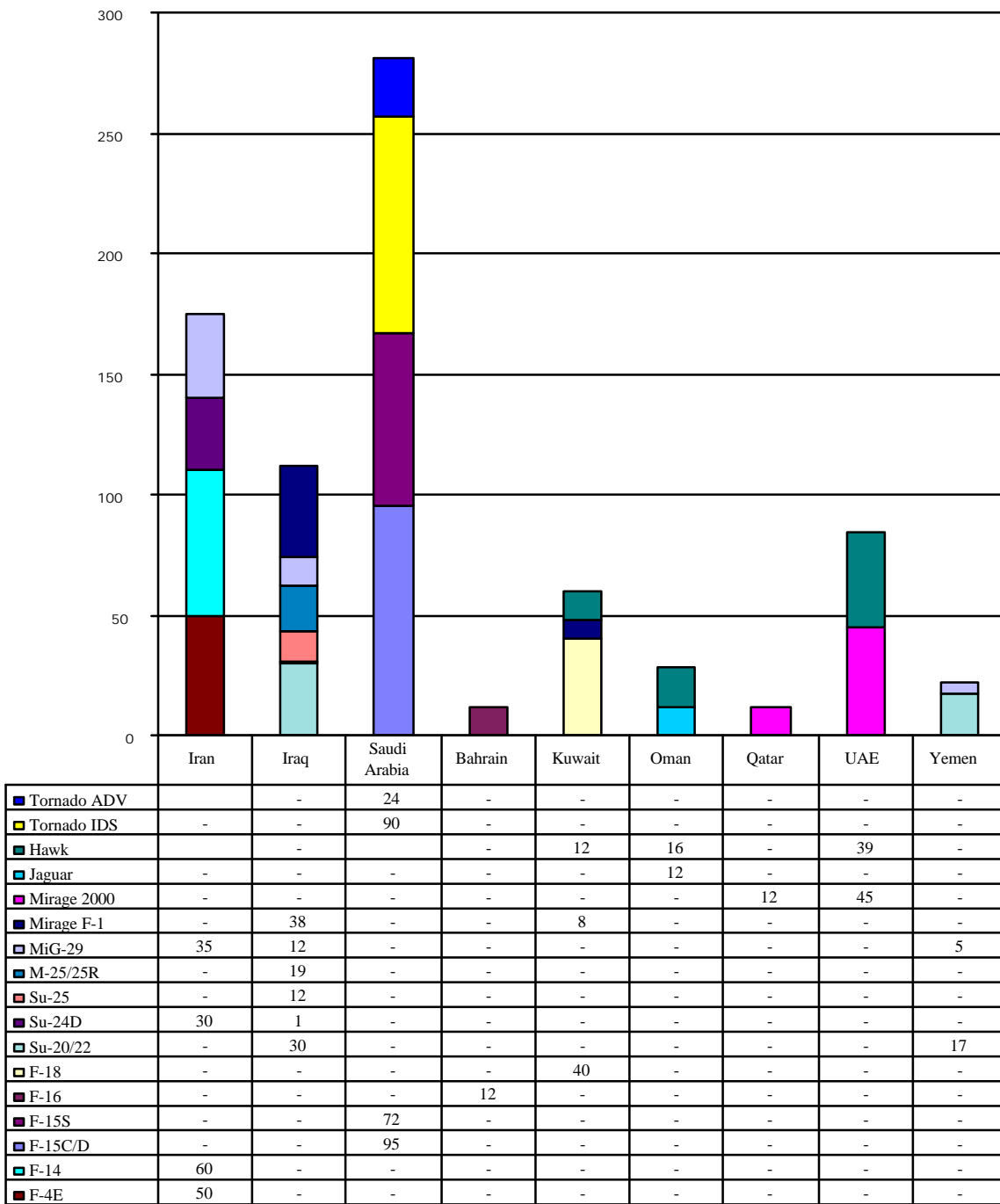


#### Armed and Attack Helicopters



Adapted by Anthony H. Cordesman from the IISS, Military Balance

### Gulf High and Medium Quality Fixed Wing Fighter, Fighter Attack, Attack, Strike, and Multi-Role Combat Aircraft By Type - 2000

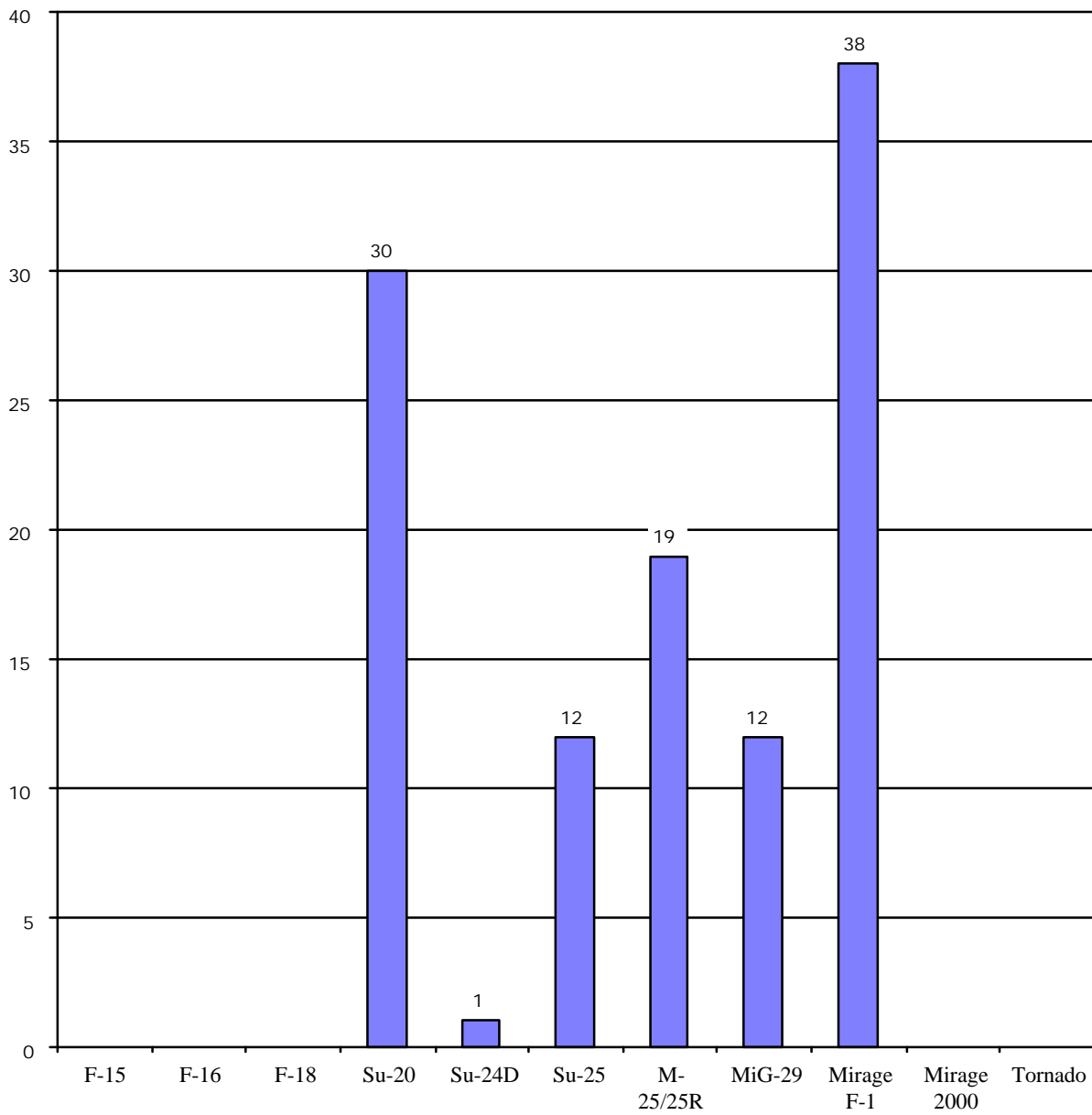


Source: Estimated by Anthony H. Cordesman from various sources and the IISS, [Military Balance](#).



### Iraqi High Quality Gulf Fixed Wing Fighter Combat Aircraft By Type - 2000

(Includes Mirage F-1, Mirage 2000, F-15, F-16, F-18, Tornado, Su-20/22, Su-24, MiG 25/25R, MiG-29)



Source: Estimated by Anthony H. Cordesman from various sources and the IISS, Military Balance.

## Gulf Land-Based Air Defense Systems in 2000

<u>Country</u>	<u>Major SAM</u>	<u>Light SAM</u>	<u>AA Guns</u>
<u>Bahrain</u>	8 IHawk	40+ RBS-70 15 Stinger 7 Crotale	12 Oerlikon 35 mm 12 L/70 40 mm
<u>Iran</u>	16/100 I Hawk 3/10 SA-5 45 HQ-2J (SA-2) ? SA-2	SA-7 <u>HN-5</u> 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
<u>Iraq</u>	SA-2 SA-3 SA-6	Roland 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
<u>Kuwait</u>	4/24 I Hawk 4/16 Patriot	6/12 Aspede 48 Starburst	6/2X35mm Oerlikon
<u>Oman</u>	None	Blowpipe 34 SA-7 <u>28 Javelin</u> 28 Rapier	10 GDF 35 mm 4 ZU-23-2 23 mm 12 L-60 40 mm
<u>Qatar</u>	None	Blowpipe <u>12 Stinger</u> 9 Roland Stinger, SA-7, Mistral	?
<u>Saudi Arabia</u>	16/128 I Hawk ? Patriot	Crotale Stinger <u>500 Redeye</u> 17/68 Shahine mobile 40 Crotale 73 Shahine static	50 AMX-30SA 30 mm 92 M-163 Vulcan 150 L-70 40 mm (in store)
<u>UAE</u>	5/30 I Hawk Bty.	20+ Blowpipe <u>Mistral</u> 12 Rapier 9 Crotale 13 RBS-70 100 Mistral	42 M-3VDA 20 mm SP 20 GCF-BM2 30 mm
<u>Yemen</u>	SA-2, SA3, SA-6	SA-7, SA-9, SA13, SA-14	52 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

### Iraqi Land-Based Air Defense Systems

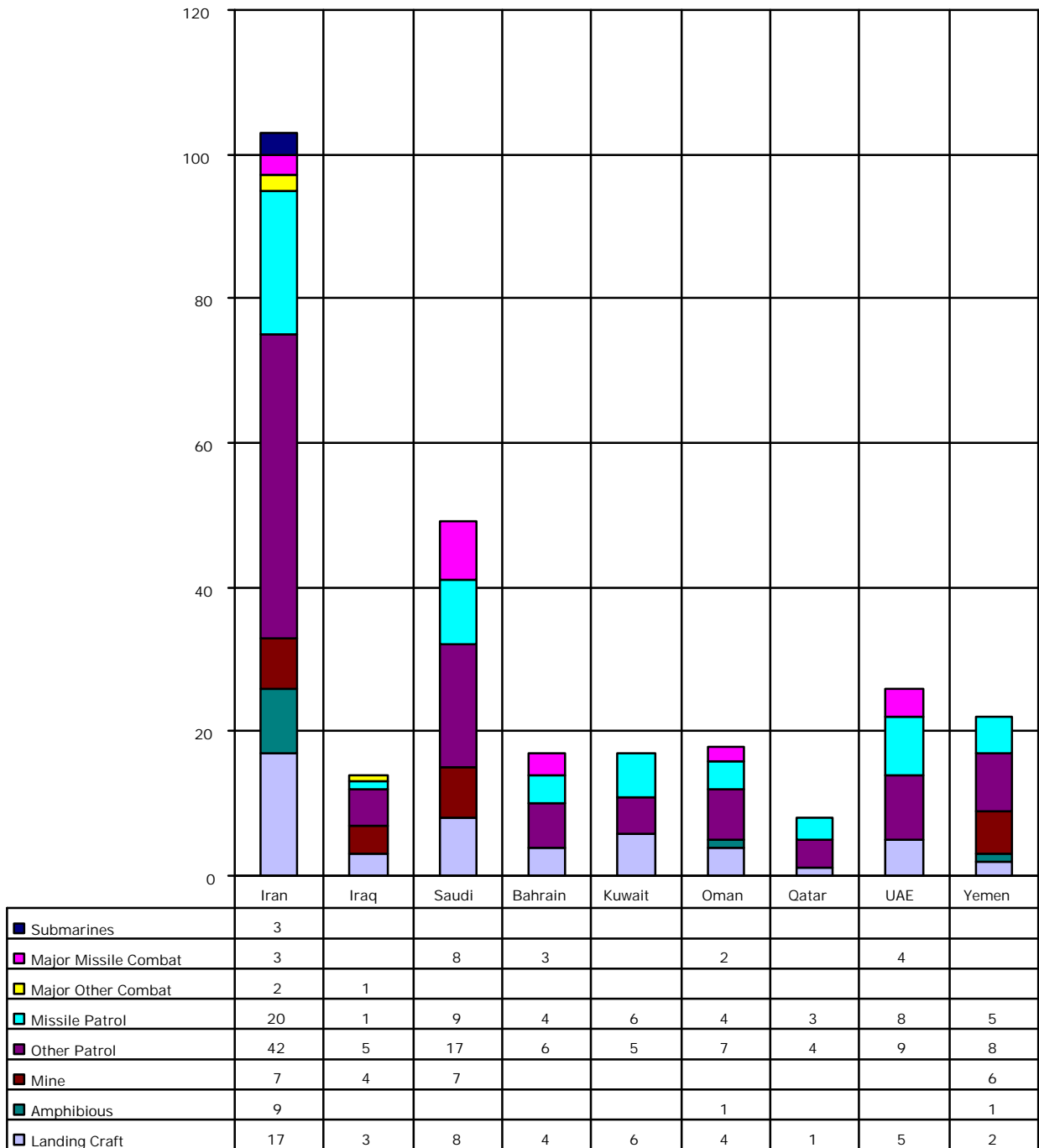
<u>Country</u>	<u>Major SAM</u>	<u>Light SAM</u>	<u>AA Guns</u>
<u>Iran</u>	12/150 I Hawk	SA-7	1,700 Guns
	3/? SA-5	<u>HN-5</u>	ZU-23, ZSU-23-4,
	45 HQ-2J (SA-2)	30 Rapier	ZSU-57-2, KS-19
	? SA-2	FM-80 (Ch Crotale)	ZPU-2/4, M-1939,
	15 Tigercat	Type 55	
<u>Iraq</u>	SA-2	Roland	6,000 Guns
	SA-3	SA-7	ZSU-23-4 23 mm,
	SA-6	SA-8	M-1939 37 mm,
		SA-9	ZSU-57-2 SP, 57 mm
		SA-13	85 mm, 100 mm, 130 mm
		SA-14	
	SA-16		

Estimated by Anthony H. Cordesman from the IISS, Military Balance and interviews with various experts

# **Part Eight**

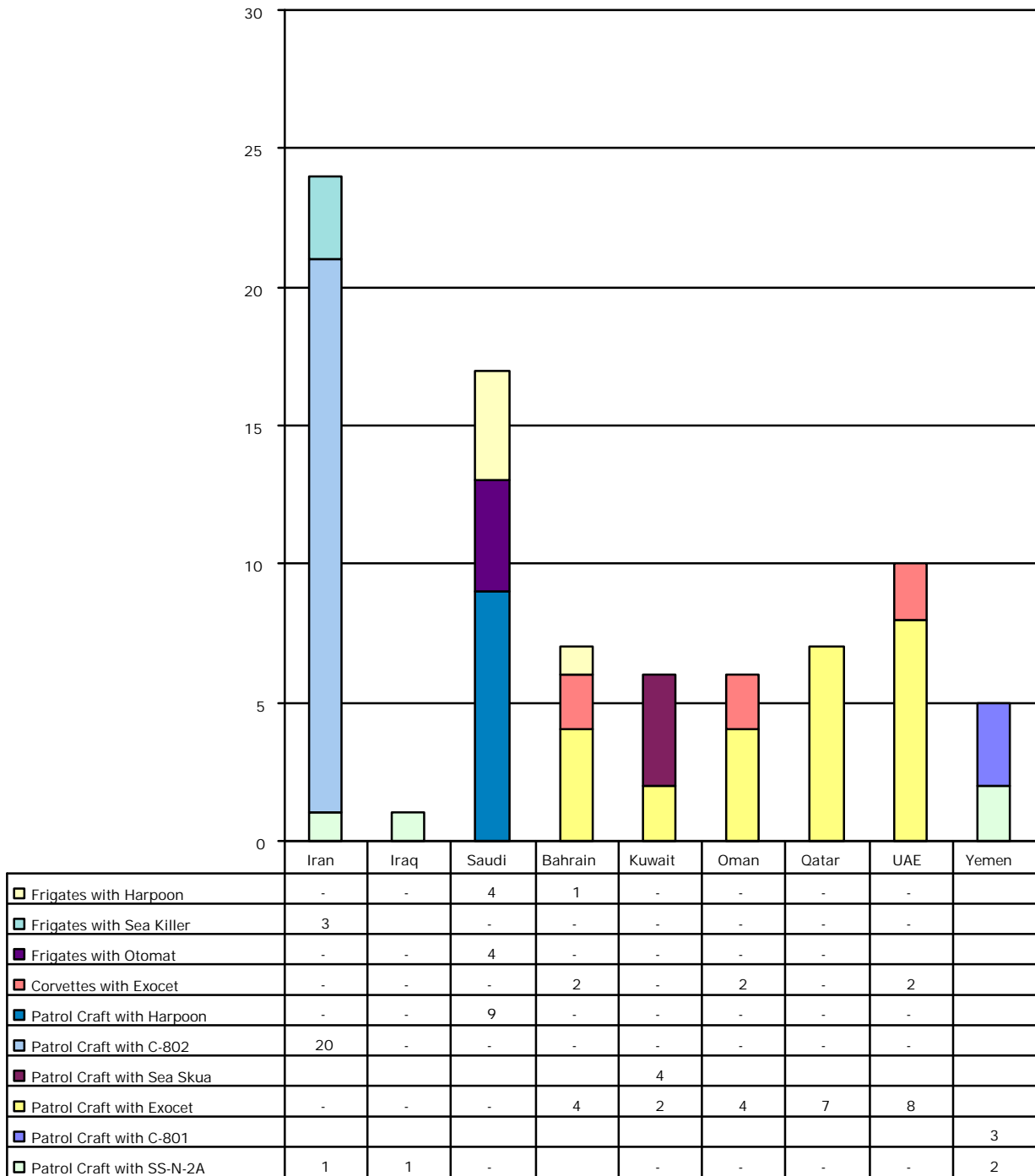
## **Trends in Iraqi Conventional Naval Forces**

### Gulf Naval Ships by Category in 2000



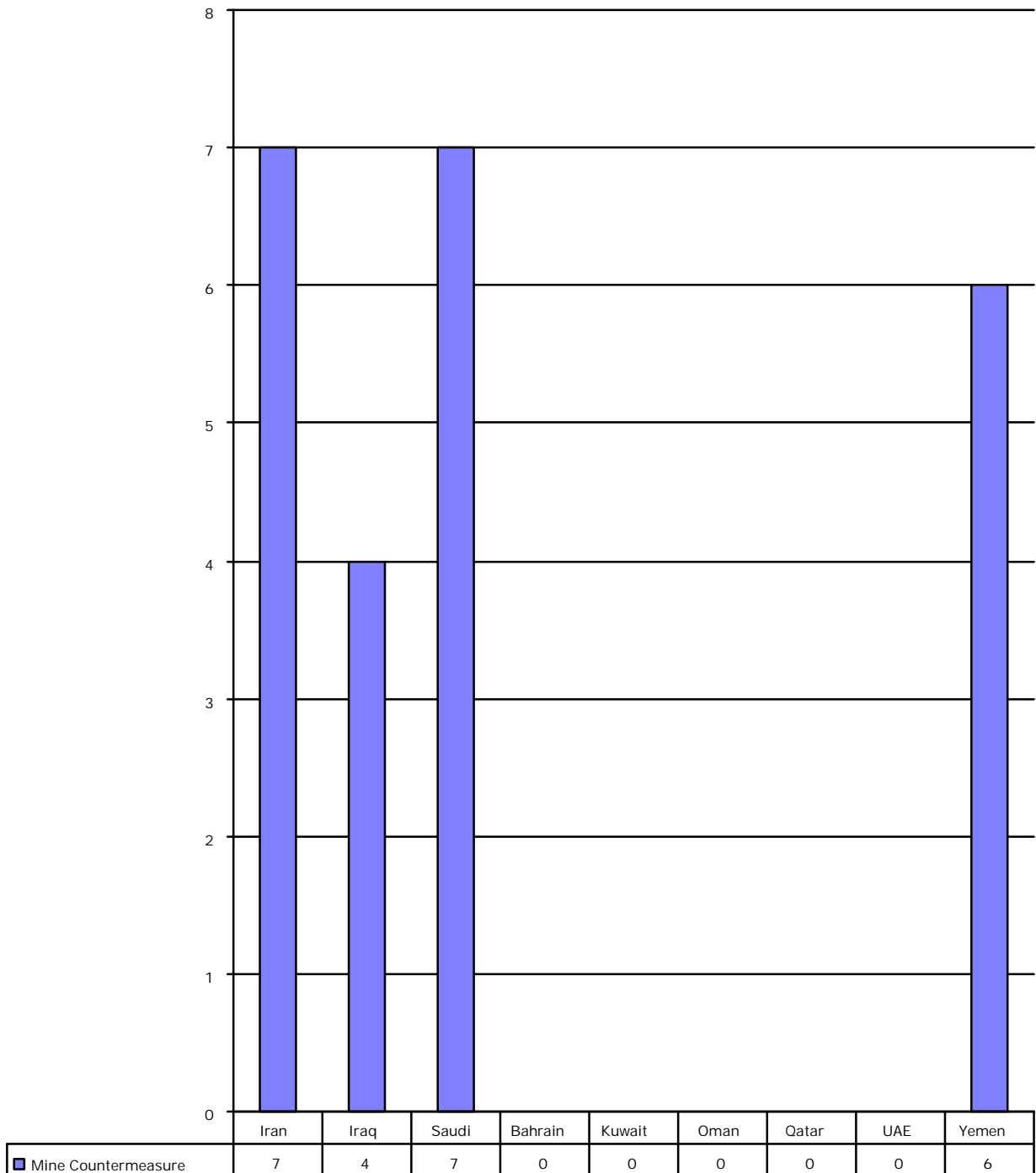
Source: Adapted by Anthony H. Cordesman from the IJSS, Military Balance, and material provided by US experts.

### Gulf Warships with Anti-Ship Missiles in 2000



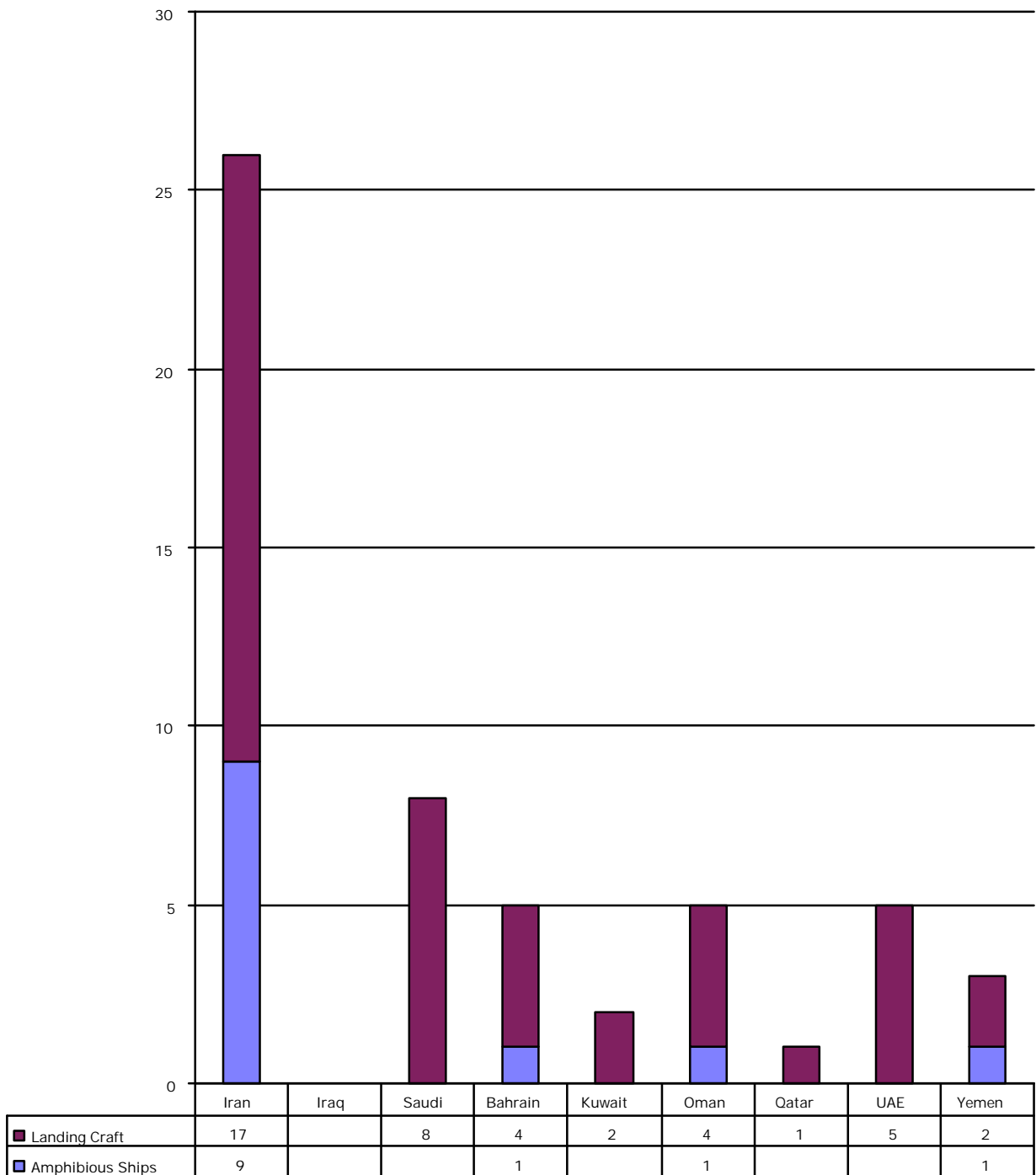
Source: Adapted by Anthony H. Cordesman from the IISS, Military Balance, and material provided by US experts.

### Gulf Mine Warfare Ships in 2000



Source: Adapted by Anthony H. Cordesman from the IISS, Military Balance, and material provided by US experts.

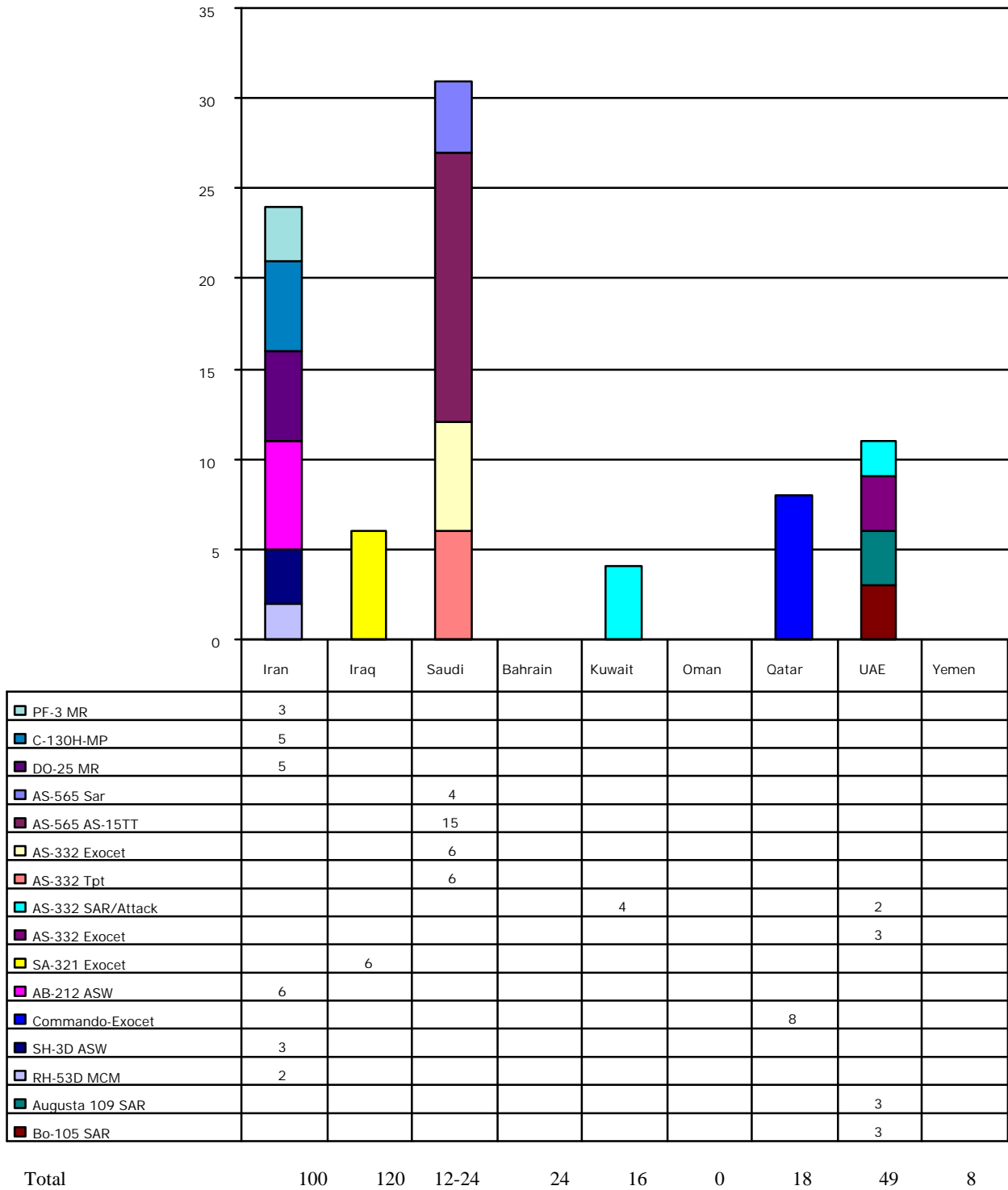
### Gulf Amphibious Warfare Ships in 2000



Source: Adapted by Anthony H. Cordesman from the IISS, Military Balance, and material provided by US experts.

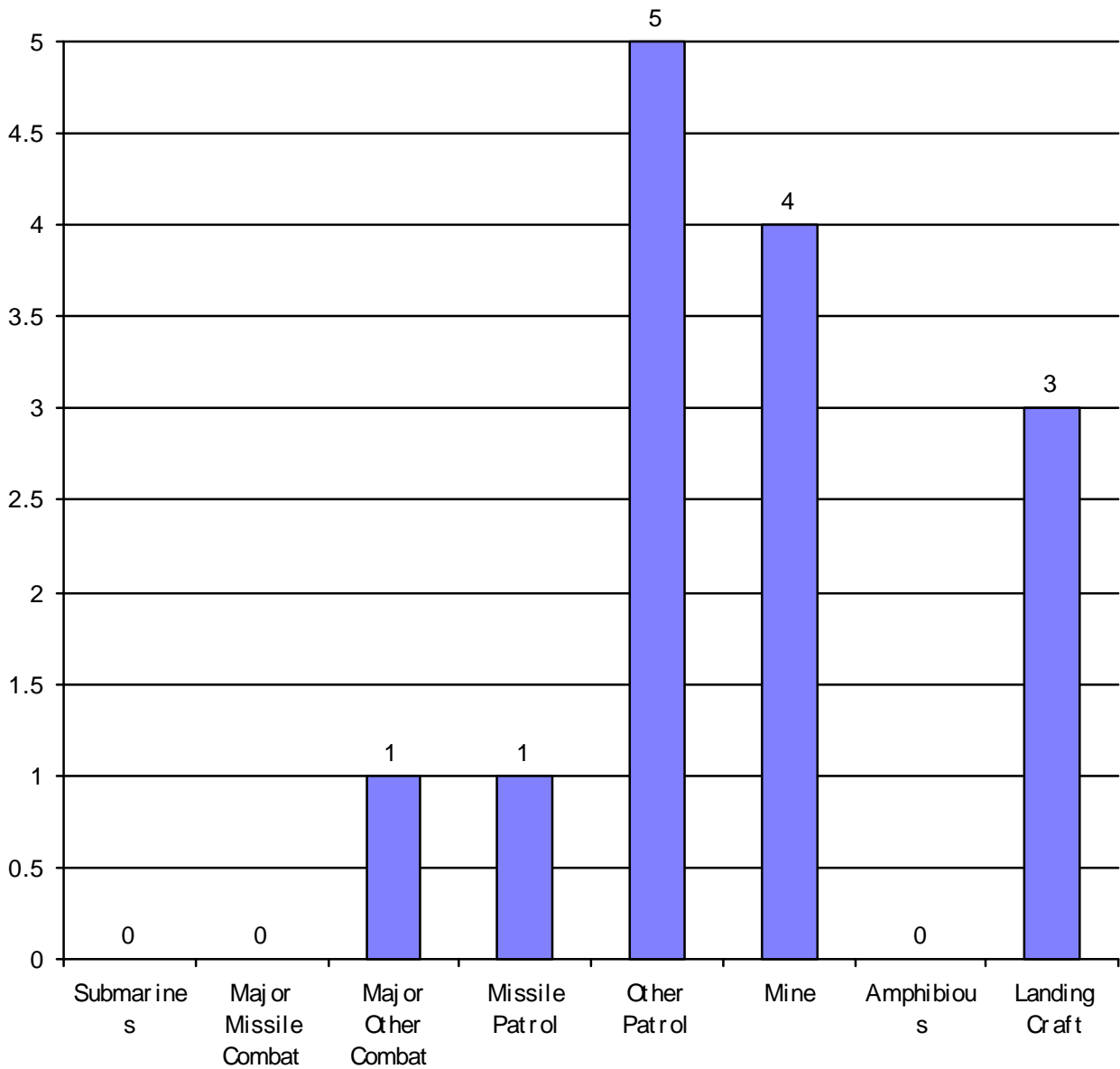


### Gulf Naval Aircraft and Helicopters Aircraft in 2000



Source: Adapted by Anthony H. Cordesman from the IISS, Military Balance.

### Iraqi Naval Ships by Category in 2000



	<u>Bahrain</u>	<u>Iran</u>	<u>Iraq</u>	<u>Kuwait</u>	<u>Oman</u>	<u>Qatar</u>	<u>Saudi</u>	<u>UAE</u>
Submarines	-	3	-	-	-	-	-	-
Major Surface Combat								
Missile	3	3	-	-	2	-	8	2
Other	-	2	1	-	-	-	-	-
Patrol Craft								
Missile	4	20	1	2	4	3	9	8
Other	6	26	5	5	9	4	21	9
Mine Vessels	0	7	4	-	-	-	6	3
Amphibious Ships	1	8	0	0	2	0	0	0
Landing Craft	4	17	3	6	4	1	8	4

Source: Adapted by Anthony H. Cordesman from the IISS, Military Balance, and material provided by US experts.

## **Part Nine**

# **Iraq and Weapons of Mass Destruction**

## 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.
- After the end of the war, the UN inspection regime destroyed many of Iraq's long-range missiles:
  - UNSCOM 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, reported that UNSCOM 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	
• imported missiles and other experimental activities (1985-1990)	69
• Expenditures during the Gulf War (January-March 1991)	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 reported 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.
- Major violations and smuggling efforts before the expulsion of UNSCOM included:
  - 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 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 interelligence experts say on 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.<sup>1</sup>
- US intelligence reports in June 2000 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.

### 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:

<u>Date</u>	<u>Area</u>	<u>Type of Gas</u>	<u>Approximate Casualties</u>	<u>Target</u>
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 191-1994, UNSCOM supervised the destruction of:
  - 38,537 filled and unfilled chemical munitions.



- 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.
- After that time, UNSCOM forced new disclosures from Iraq that 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 reported 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.
- 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.
- 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):

<u>Agent</u>	<u>Declared</u>	Potential Unaccounted For	<u>Comments</u>
<u>Chemical Agents</u>	(Metric Tons)	(Metric Tons)	
VX Nerve Gas	3	300	Iraq lied about the program until 1995
G Agents (Sarin)	100-150	200	Figures include weaponized and bulk agents
Mustard Gas	500-600	200	Figures include weaponized and bulk agents
<u>Delivery Systems</u>	(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."
- The CIA reported in January 1999 that Iraq has 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.”
- 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 reinstate 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 be 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.<sup>2</sup>

### **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.

- Iraq has presented three versions of FFCDs and four “drafts” since July 1995,
  - 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.
  - 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 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.
  - Imported type cultures from the US which can be modified to develop biological weapons.
  - 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 aspergillus 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.
  - 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); 8,500 liters of concentrated Anthrax (6,500 liters filled into munitions); and 2,500 liters of concentrated Aflatoxin (1,850 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 is also known to have produced at least:
    - 1,850 liters of Aflatoxin in solution at Fudaliyah.
    - 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:
  - 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.
  - 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):

<u>Agent</u>	<u>Declared Concentrated Amount</u>		<u>Declared Total Amount</u>		<u>Uncertainty</u>
	<u>Liters</u>	<u>Gallons</u>	<u>Liters</u>	<u>Gallons</u>	
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 Perfringens	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 never confirmed the unilateral destruction of 25 warheads. It can confirm the destruction of 23 of at least 157 bombs. Iraq may have more aerosol tanks.
- Before its inspection, UNSCOM inspected 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.

- 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 be 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.<sup>3</sup>

### **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<sub>2</sub>, UCL<sub>4</sub>, UF<sub>6</sub>, 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<sub>4</sub>.
  - 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 Calutron (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 found and destroyed, or secured, new stockpiles of illegal enriched material, major production and R&D facilities, and equipment-- including Calutron enriching equipment.
- 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 import 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 examining the purchase of fissile material from outside Iraq.
  - Is it 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.
- 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 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.<sup>4</sup>

Source: Prepared by Anthony H. Cordesman, Senior Advisor for Strategic Assessment, CSIS.

## **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 improved 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 be 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.

## 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 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."

## 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.

## Iraqi Chemical Warfare Program

### CW Agent Stockpiles (In Metric tons)

<b>CW Agent</b>	<b>Chemical Agents Declared by Iraq</b>	<b>Potential CW Agents based on Unaccounted Precursors <sup>1.)</sup></b>	<b>Comments</b>
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)

<b>Delivery System</b>	<b>Estimated Numbers Before the Gulf War</b>	<b>Munitions Unaccounted for <sup>2.)</sup></b>	<b>Comments</b>
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	UNSCOM supervised the destruction of
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 dual-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.



### **Iraq's Major Uses of Chemical Weapons 1983-1988**

<u>Date</u>	<u>Area</u>	<u>Type of Gas</u>	<u>Approximate Casualties</u>	<u>Target</u>
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.

## Iraqi Biological Warfare Program

### BW Agent Production Amounts

<b>BW Agent</b>	<b>Declared Concentrated Amounts</b>	<b>Declared Total Amounts</b>	<b>Comments</b>
Anthrax amounts(Bacillusanthracis)	8,500 liters (2,245 gallons)	85,000 liters (22,557 gallons)	UNSCOM estimates production were actually 3-4 times more than the declared amounts, but is unable to confirm.
Botulinum toxin (Clostridium Botulinum) (10x and 20x concentrated)	19,400 liters (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

<b>Delivery System</b>	<b>Anthrax</b>	<b>Botulinum Toxin</b>	<b>Aflatoxin</b>	<b>Comments</b>
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
Aircraft aerosol spray tanks F-1 Mirage modified fuel drop tank	4			Iraq claims to have produced 4, but may have manufactured others.

### BW Agent Growth Media

<b>Media</b>	<b>Quantity Imported</b>	<b>Unaccounted For Amounts</b>
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.

## Iraqi Key Personalities in Proliferation

Husayn Kamil Hasan al-Majid, Saddam's son-in-law, was the pre-eminent military industries official and a fundamental player in Iraq's efforts to procure weapons of mass destruction before his defection to Jordan in August 1995. A strict and capable manager, Kamil took charge of Iraq's efforts to develop its WMD program around 1987. As the head of the Ministry of Industry and Military Industrialization until 1990, he oversaw Iraq's nuclear weapons research, continued Iraq's development of biological and chemical weapons, and supervised the successful development of the Al-Husayn missile -- an indigenous modification of the Scud. During this time, it is possible that Kamil directed Iraq's testing of its chemical and biological weapons on Iranian prisoners of war.

-- After the Gulf war, Kamil -- first from his position as Minister of Defense and then as the director of the Ministry of Industry and Minerals and the Organization of Military Industrialization -- led Iraq's efforts to conceal its WMD program from international inspectors.

-- Husayn Kamil's influence over the Iraqi weapons of mass destruction program did not end with his defection in 1995. For instance, he is largely responsible for using Saddam's security services -- of which he was a member in the early 1980s -- to hide proscribed materials and documents from the United Nations.

Despite Kamil's influence, the Iraqi WMD program did not die with his defection and subsequent murder, as Iraq claims it did. Qusay Husayn -- Saddam's second son -- has assumed many of the responsibilities for concealing the proscribed programs. In addition, many of the leading scientists in Iraq's WMD programs during Husayn Kamil's tenure are still associated with the regime:

-- Lt. Gen. Amir Hamud Sadi -- who serves officially as a presidential adviser and is a leading official in Iraqi relations with UNSCOM -- was one of the principal engineers in the WMD program and essentially served as Husayn Kamil's deputy. With a doctorate in chemical engineering, Sadi has dedicated his entire career to conventional and non-conventional weapons development. In 1987, Sadi received rare public praise from Saddam for his role in the development of the Al-Husayn missile.

-- Humam Abd al-Khaliq Abd al-Ghafur -- currently Minister of Culture and Information -- is Iraq's leading nuclear official and the former head of its nuclear program. Abd al-Ghafur also was a close associate of Husayn Kamil, and he occasionally serves as an interlocutor with the IAEA, leading an Iraqi delegation to the IAEA annual conference in October 1997.

-- Jafar Dia Jafar is perhaps Iraq's foremost nuclear scientist and served as Abd al-Ghafur's deputy in the Iraqi Atomic Energy Organization. Jafar now officially serves as a presidential adviser, but his position -- unlike that of Sadi -- appears to be largely nominal.

-- Dr. Rihab Taha is the leading official in charge of Iraq's biological weapons program. She has overseen Iraqi efforts to develop anthrax and Botulinum toxin and directed testing on animal subjects. Taha is also politically well-connected -- she is married to the Minister of Oil, Amir Rashid Ubaydi, who helps direct Iraqi relations with UNSCOM.

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

## **Terrorism and Unconventional War Fighting Options**

- **Unconventional and terrorist delivery means offer significant incentives.**
- **Powers like Iran and Syria have used terrorists and extremists as proxies in attacking neighbors.**
- **Biological warfare -- the easiest way to achieve extremely high lethalties -- is best conducted in this manner.**
- **Past terrorist attacks have shown it can take months to years to firmly characterize the enemy and where terrorism have full state support.**
- **“Plausible deniability” may exist indefinitely and a state subject to an existential attack has no meaningful way to retaliate.**

## The Problem of Terrorism and Unconventional Warfare

- Existing and projected detection and control technologies, arms control proposals, and concepts for missile defense assume that the primary threats are organized states and that relatively large efforts must be used.
- Conventional structures of deterrence assume identifiable and limited sets of opponents and similar values in dealing with issues like mutual destruction. Terrorist movements may be willing to take catastrophic risks, as may leaders who identify themselves with state and/or see martyrdom as a valid alternative to victory.
- War may not be between states or fought for limited strategic objectives. It may be a war of proxies or terrorists. It may be fought to destroy peoples or with minimal regard for collateral damage and risks.
- The target of unconventional uses of weapons of mass destruction may not be military in the normal sense of the term. It may be a peace process, US commitment to the defense of a given region, a peace keeping force, an election or ruling elite, or growing cooperation between formerly hostile groups.
- Terrorist organizations have already attempted to use crude chemical weapons. The development and use of chemical and biological weapons is well within the capability of many extremist and terrorist movements, and states can transfer weapons or aid such movements indirectly or with plausible deniability.
- Covert or unconventional delivery means may be preferable to both states and non-state organizations. Cargo ships, passenger aircraft, commercial vehicles, dhows, or commercial cargo shipments can all be used, and routed through multiple destinations. A well established series of covert transport and smuggling networks exist throughout the region. Biological weapons can be manufactured in situ.
- The Marine Corps Barracks incident has already shown the potential value of “mass terrorism,” as had the media impact of the Oklahoma City bombing and disruptive effect of far more limited events like the suicide bombings by Hamas and the assassination of Yitzak Rabin.
- Biological weapons and chemical present special problems because they can be used in so many ways. Chemical poisons were once used to contaminate the Israeli fruit group. Infectious biological agents could be used to mirror image local diseases or with long gestation times. Persistent nerve agents could be used in subways, large buildings, shopping malls/bazaars, etc. to create both immediate casualties and long term risks. Mixes of biological and chemical agents could be used to defeat detection, protection gear or vaccines.
- Arms control efforts assume large state efforts with detectable manufacturing and weaponization programs in peacetime. The development of a capability to suddenly manufacture several hundred biological and chemical weapons with little or no warning is well within the state of the art using nothing but commercial supplies and equipment, and much of the R&D effort could be conducted as civil or defensive research.
- Unconventional and terrorist uses of weapons can involve the use of extremely high risk biological weapons transmitted by human carriers, commercial cargoes, etc.
- The incentives for the unconventional use of weapons of mass destruction increase in proportion to the lack of parity in conventional weapons, the feelings of hopelessness by alienated or extremist groups, or the prospect of catastrophic defeat.
- Most countries lack gas masks, anti-toxins, etc. to protect both citizens and workers in vital facilities like ports.
- Similarly, the incentive for the unconventional use of weapons of mass destruction will increase in direct proportion to the perceived effectiveness of theater missile and other regular military defense systems.
- Destabilizing State operations will be a constant temptation for state intelligence groups, militant wings of extremist groups, revolutionary forces. etc.

## Attack Scenarios: Part One

- A radiological power is introduced into the air conditioning systems of Cairo's high-rise tourist hotels. Symptoms are only detected over days or weeks or public warning is given several weeks later. The authorities detect the presence of such a power, but cannot estimate its long-term lethality and have no precedents for decontamination. Tourism collapses, and the hotels eventually have to be torn down and rebuilt.
- Parts for a crude gun-type nuclear device are smuggled into Israel or bought in the market place. The device is built in a medium sized commercial truck. A physics student reading the US Department of Defense weapons effect manual maps Tel Aviv to maximize fall out effects in an area filled with buildings with heavy metals and waits for a wind maximizing the fall out impact. The bomb explodes with a yield of only 8 kilotons, but with an extremely high level of radiation. Immediate casualties are limited but the long-term death rate mounts steadily with time. Peace becomes impossible and security measures become Draconian. Immigration halts and emigration reaches crisis proportions. Israel as such ceases to exist.
- Several workers move drums labeled as cleaning agents into a large shopping mall, large public facility, subway, train station, or airport. They dress as cleaners and are wearing what appear to be commercial dust filters or have taken the antidote for the agent they will use. They mix the feedstocks for a persistent chemical agent at the site during a peak traffic period. Large scale casualties result, and Draconian security measures become necessary on a national level. A series of small attacks using similar "binary" agents virtually paralyze the economy, and detection is impossible except to identify all canisters of liquid.
- Immunized terrorists visit a US carrier or major Marine assault ship during the first hours of visitor's day during a port call in the Middle East. They are carrying anthrax powder in bags designed to make them appear slightly overweight. They slowly scatter the powder as they walk through the ship visit. The immediate result is 50% casualties among the ship's crew, its Marine complement, and the visitors that follow. The US finds it has no experience with decontaminating a large ship where anthrax has entered the air system and is scattered throughout closed areas. After long debates over methods and safety levels, the ship is abandoned.
- A terrorist seeking to "cleanse" a nation of its secular regime and corruption introduces a modified type culture of Ebola or a similar virus into an urban area -- trusting God to "sort out" the resulting casualties. He scatters infectious cultures in urban areas for which there is no effective treatment. By the time the attack is detected, it has reached epidemic proportions. Medical authorities rush into the infected area without proper protection, causing the collapse of medical facilities and emergency response capabilities. Other nations and regions have no alternative other than to isolate the nation or center under attack, letting the disease take its course.
- A terrorist group modifies the valves on a Japanese remote-controlled crop spraying helicopter which has been imported legally for agricultural purposes. It uses this system at night or near dawn to spray a chemical or biological agent at altitudes below radar coverage in a line-source configuration. Alternatively, it uses a large home-built RPV with simple GPS guidance. The device eventually crashes undetected into the sea or in the desert. Delivery of a chemical agent achieves far higher casualties than any conventional military warhead. A biological agent is equally effective and the first symptoms appear days after the actual attack -- by which time treatment is difficult or impossible.

## Attack Scenarios: Part Two

- A truck filled with what appears to be light gravel is driven through the streets of Tel Aviv or Cairo during rush hour or another maximum traffic period. A visible powder does come out through the tarpaulin covering the truck, but the spread of the powder is so light that no attention is paid to it. The driver and his assistant are immunized against the modified form of Anthrax carried in the truck which is being released from behind the gravel or sand in the truck. The truck slowly quarters key areas of the city. Unsuspected passersby and commuters not only are infected, but carry dry spores home and into other areas. By the time the first major symptoms of the attack occur some 3-5 days later, anthrax pneumonia is epidemic and some septicemic anthrax has appeared. Some 40-65% of the exposed population dies and medical facilities collapse causing serious, lingering secondary effects.
- A terrorist group scatters high concentrations of a radiological, chemical, or biological agent in various areas in a city, and trace elements into the processing intakes to the local water supply. When the symptoms appear, terrorist group makes its attack known, but claims that it has contaminated the local water supply. The authorities are forced to confirm that water is contaminated and mass panic ensues.
- Immunized terrorists carry small amounts of anthrax or a similar biological agent onto a passenger aircraft like a B-747, quietly scatter the powder, and deplane at the regular scheduled stop. No airport detection system or search detects the agent. Some 70-80% of those on the aircraft die as a result of symptoms that only appear days later.
- Several identical nuclear devices are smuggled out of the FSU through Afghanistan or Central Asia. They do not pass directly through governments. One of the devices is disassembled to determine the precise technology and coding system used in the weapon's PAL. This allows users to activate the remaining weapons. The weapon is then disassembled to minimize detection with the fissile core shipped covered in lead. The weapon is successfully smuggled into the periphery of an urban area outside any formal security perimeter. A 100 kiloton ground burst destroys a critical area and blankets the region in fall out.
- The same device is shipped to Israel or a Gulf area in a modified standard shipping container equipped with detection and triggering devices that set it off as a result of local security checks or with a GPS system that sets it off automatically when it reaches the proper coordinates in the port of destination. The direct explosive effect is significant, but "rain out" contaminates a massive local area.
- Iraq equips a freighter or dhow to spread Anthrax along a coastal area in the Gulf. It uses a proxy terrorist group, and launches an attack on Kuwait City and Saudi oil facilities and ports. It is several days before the attack is detected, and the attacking group is never fully identified. The form of Anthrax involved is dry and time encapsulated to lead to both massive prompt casualties and force time consuming decontamination. Iraq not only is revenged, but benefits from the resulting massive surge in oil prices.
- A terrorist group scatters small amounts of a biological or radiological agent in a Jewish area during critical stages of the final settlement talks. Near panic ensues, and a massive anti-Palestinian reaction follows. Israeli security then learns that the terrorist group has scattered small amounts of the same agent in cells in every sensitive Palestinian town and area, and the terrorist group announces that it has also stored some in politically sensitive mosques and shrines. Israeli security is forced to shut down all Palestinian movement and carry out intrusive searches in every politically sensitive area. Palestinian riots and then exchanges of gun fire follow. The peace talks break down permanently.
- The Iranian Revolutionary Guards equips dhows to spread Anthrax. The dhows enter the ports of Dubai and Abu Dhabi as commercial vessels -- possibly with local or other Southern Gulf registrations and flags. It is several days before the attack is detected, and the resulting casualties include much of the population of Abu Dhabi and government of the UAE. The UAE breaks up as a result, no effective retaliation is possible, and Iran achieves near hegemony over Gulf oil policy.

### **Attack Scenarios: Part Three**

- A terrorist group attempting to drive Western influence out of Saudi Arabia smuggles a large nuclear device into Al Hufuf on the edge of the Ghawar oil field. It develops a crude fall out model using local weather data which it confirms by sending out scouts with cellular phones. It waits for the ideal wind, detonates the devices, shuts down the world's largest exporting oil field, and causes the near collapse of Saudi Arabia.
- Alternatively, the same group takes advantage of the security measures the US has adopted in Saudi Arabia, and the comparative isolation of US military personnel. It waits for the proper wind pattern and allows the wind to carry a biological agent over a Saudi airfield with a large US presence from an area outside the security perimeter. The US takes massive casualties and has no ability to predict the next attack. It largely withdraws from Saudi Arabia.
- A freighter carrying fertilizer enters a Middle Eastern port and docks. In fact, the freighter has mixed the fertilizer with a catalyst to create a massive explosion and also carries a large amount of a chemical, radiological, and/or biological agent. The resulting explosion destroys both the immediate target area and scatters the chemical or biological weapon over the area.
- Extreme believers in Eretz Israel move a "cocktail" of radiological and persistent biological/chemical agents to the Temple Mount to contaminate the Mosques. They use carefully designed devices which only scatter very heavy matter over a limited area, although they use explosives to ensure a high degree of contamination within the mosques. All prayer in the mosque area must be halted indefinitely and there are significant casualties among the Islamic faithful in Jerusalem. The Jewish group issues a statement demanding that the temple area be clear of all non-Jewish religious activity triggering mass violence.
- A large terrorist device goes off in a populated, critical economic, or military assembly area -- scattering mustard or nerve gas. Emergency teams rush into deal with the chemical threat and the residents are evacuated. Only later does it become clear that the device also included a biological agent and that the response to this "cocktail" killed most emergency response personnel and the evacuation rushed the biological agent to a much wider area.



## The Comparative Effects of Biological, Chemical, and Nuclear Weapons Against a Typical Urban Target in the Middle East

Using missile warheads: Assumes one Scud sized warhead with a maximum payload of 1,000 kilograms. The study assumes that the biological agent would not make maximum use of this payload capability because this is inefficient. It is unclear this is realistic.

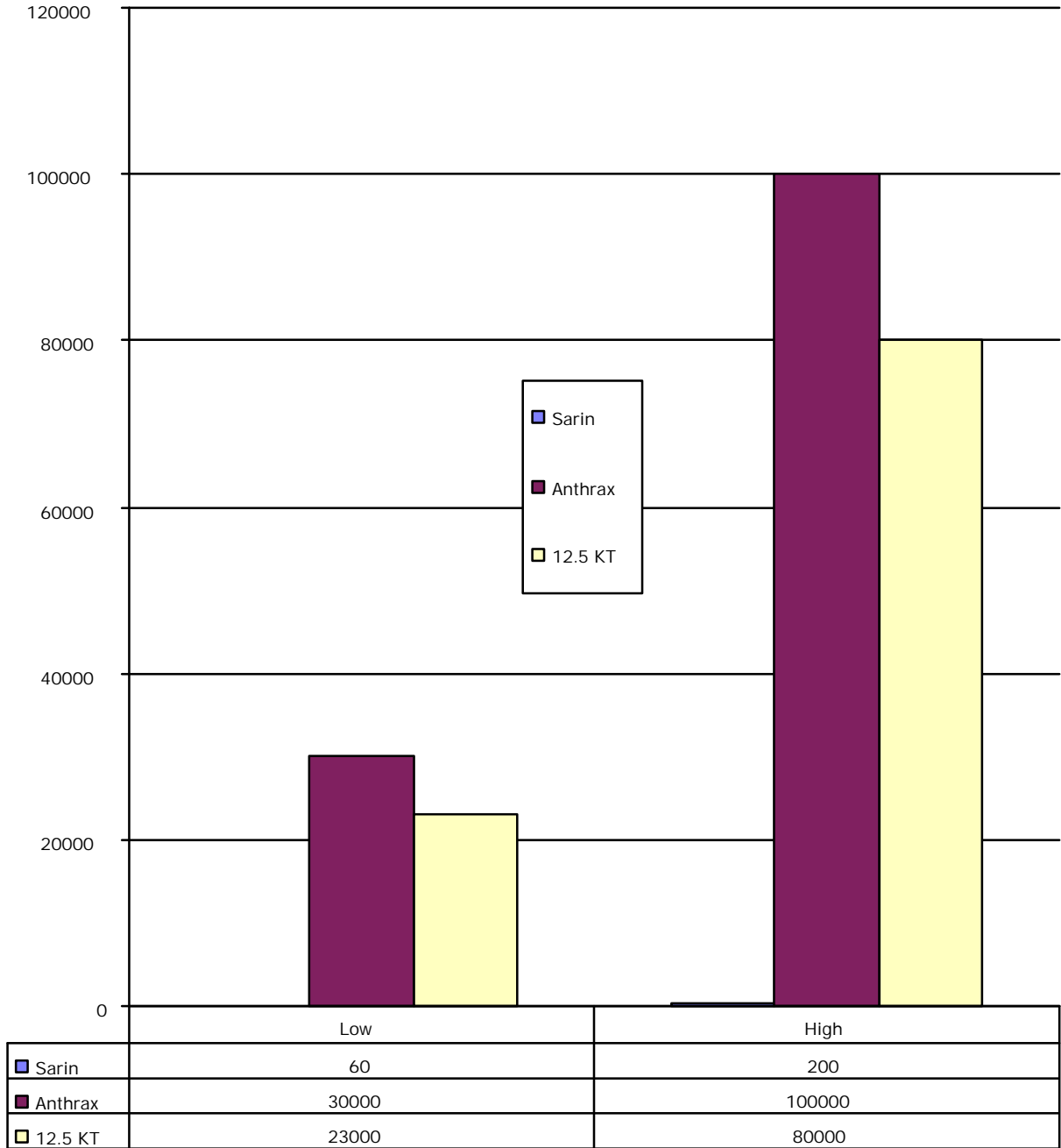
<u>Per Square Kilometer</u>	<u>Area Covered in Square Kilometers</u>	<u>Deaths Assuming 3,000-10,000 people</u>
<u>Chemical:</u> 300 kilograms of Sarin nerve gas with a density of 70 milligrams per cubic meter	0.22	60-200
<u>Biological</u> 30 kilograms of Anthrax spores with a density of 0.1 milligram per cubic meter	10	30,000-100,000
<u>Nuclear:</u>		
One 12.5 kiloton nuclear device achieving 5 pounds per cubic inch of over-pressure	7.8	23,000-80,000
One 1 megaton hydrogen bomb	190	570,000-1,900,000

Using one aircraft delivering 1,000 kilograms of Sarin nerve gas or 100 kilograms of anthrax spores: Assumes the aircraft flies in a straight line over the target at optimal altitude and dispensing the agent as an aerosol. The study assumes that the biological agent would not make maximum use of this payload capability because this is inefficient. It is unclear this is realistic.

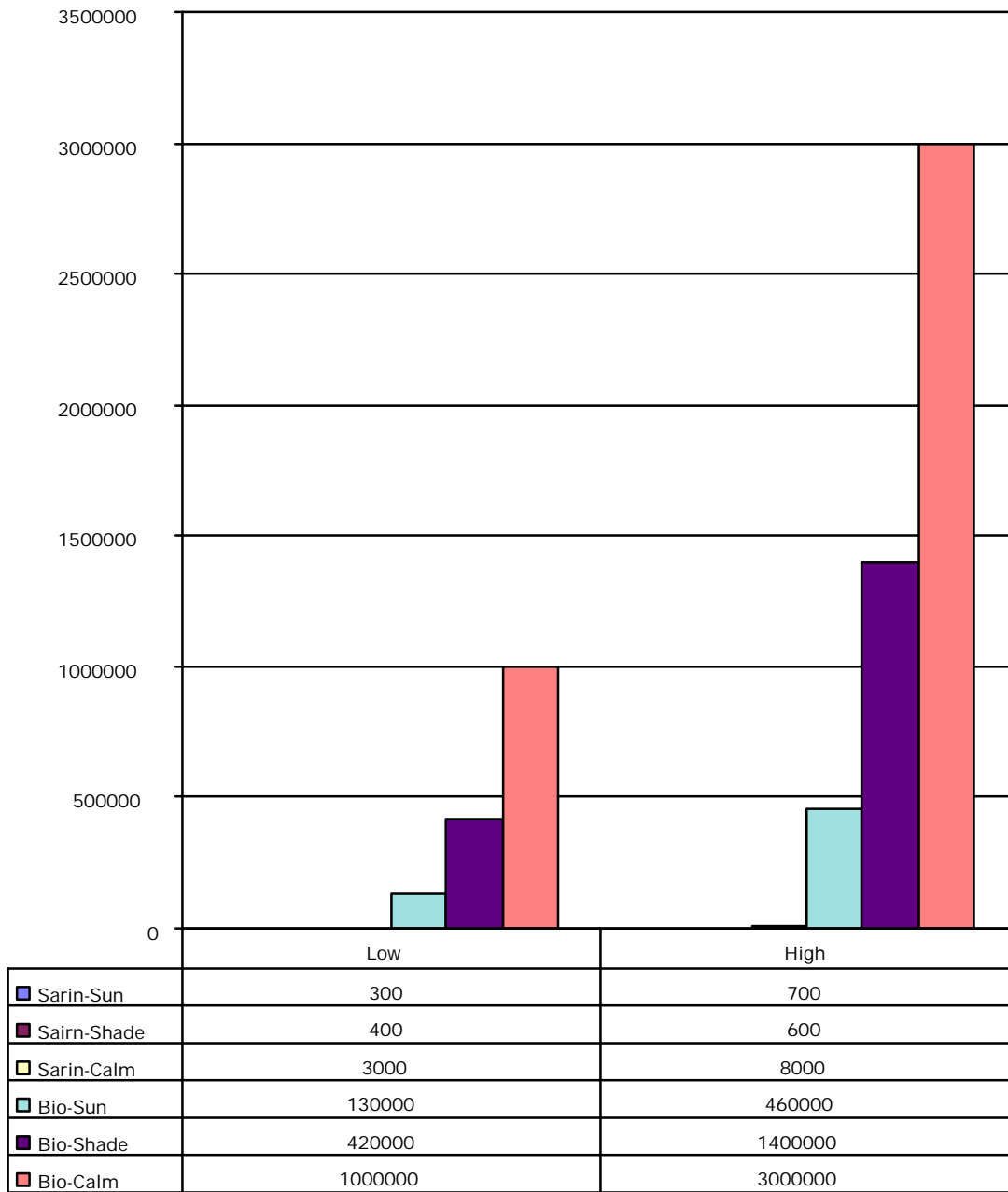
	<u>Area Covered in Square Kilometers</u>	<u>Deaths Assuming 3,000-10,000 people Per Square Kilometer</u>
<u>Clear sunny day, light breeze</u>		
Sarin Nerve Gas	0.74	300-700
Anthrax Spores	46	130,000-460,000
<u>Overcast day or night, moderate wind</u>		
Sarin Nerve Gas	0.8	400-800
Anthrax Spores	140	420,000-1,400,000
<u>Clear calm night</u>		
Sarin Nerve Gas	7.8	3,000-8,000
Anthrax Spores	300	1,000,000-3,000,000

Source: Adapted by the Anthony H. Cordesman from Office of Technology Assessment, Proliferation of Weapons of Mass Destruction: Assessing the Risks, US Congress OTA-ISC-559, Washington, August, 1993, pp. 53-54.

### The Relative Killing Effect of Chemical vs. Biological Weapons of Mass Destruction for a 1,000 Kilogram Bomb or Warhead

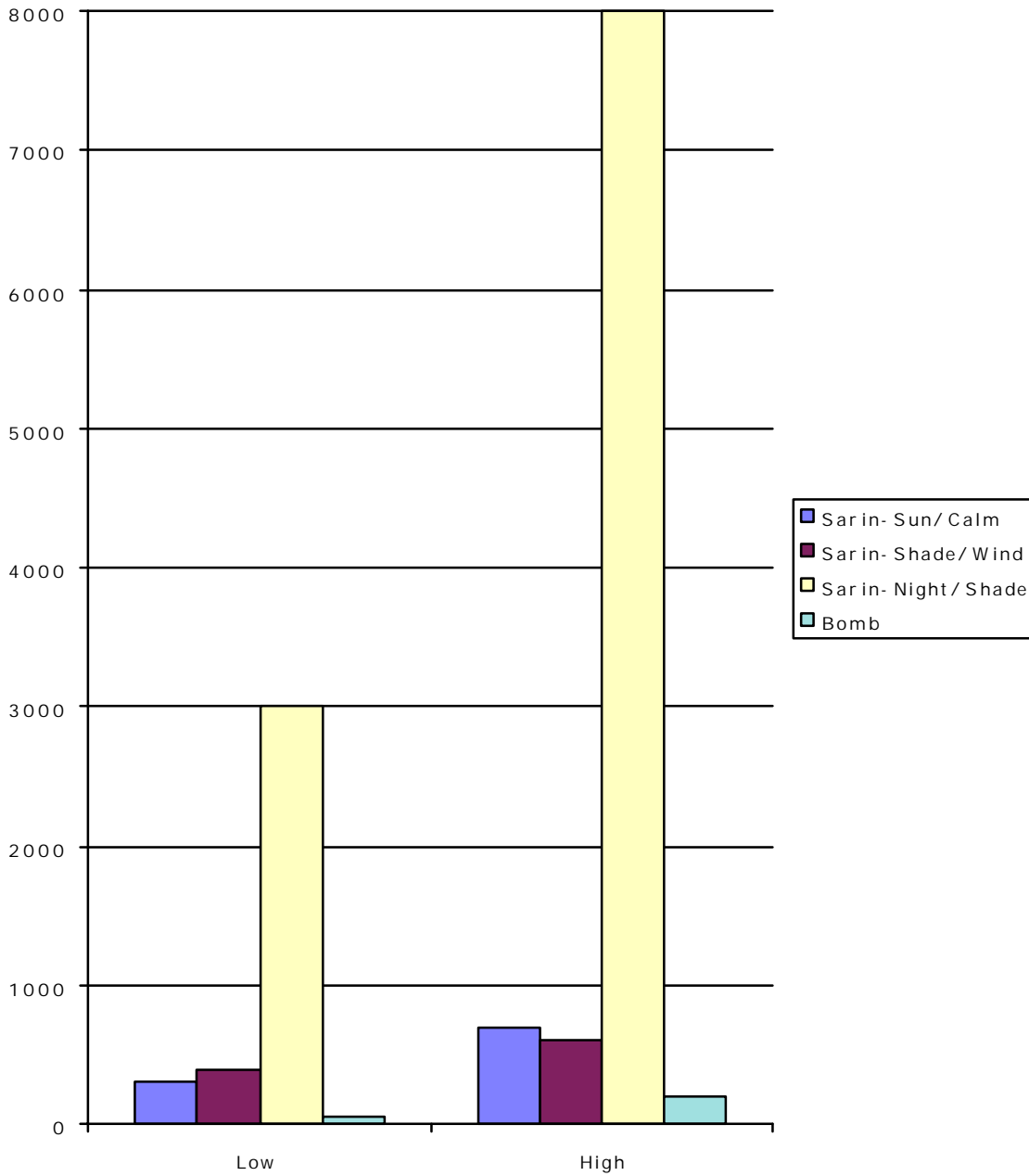


### The Relative Killing Effect in Numbers of Dead for Biological vs. Chemical Weapons with a Optimal Aerosol Delivery



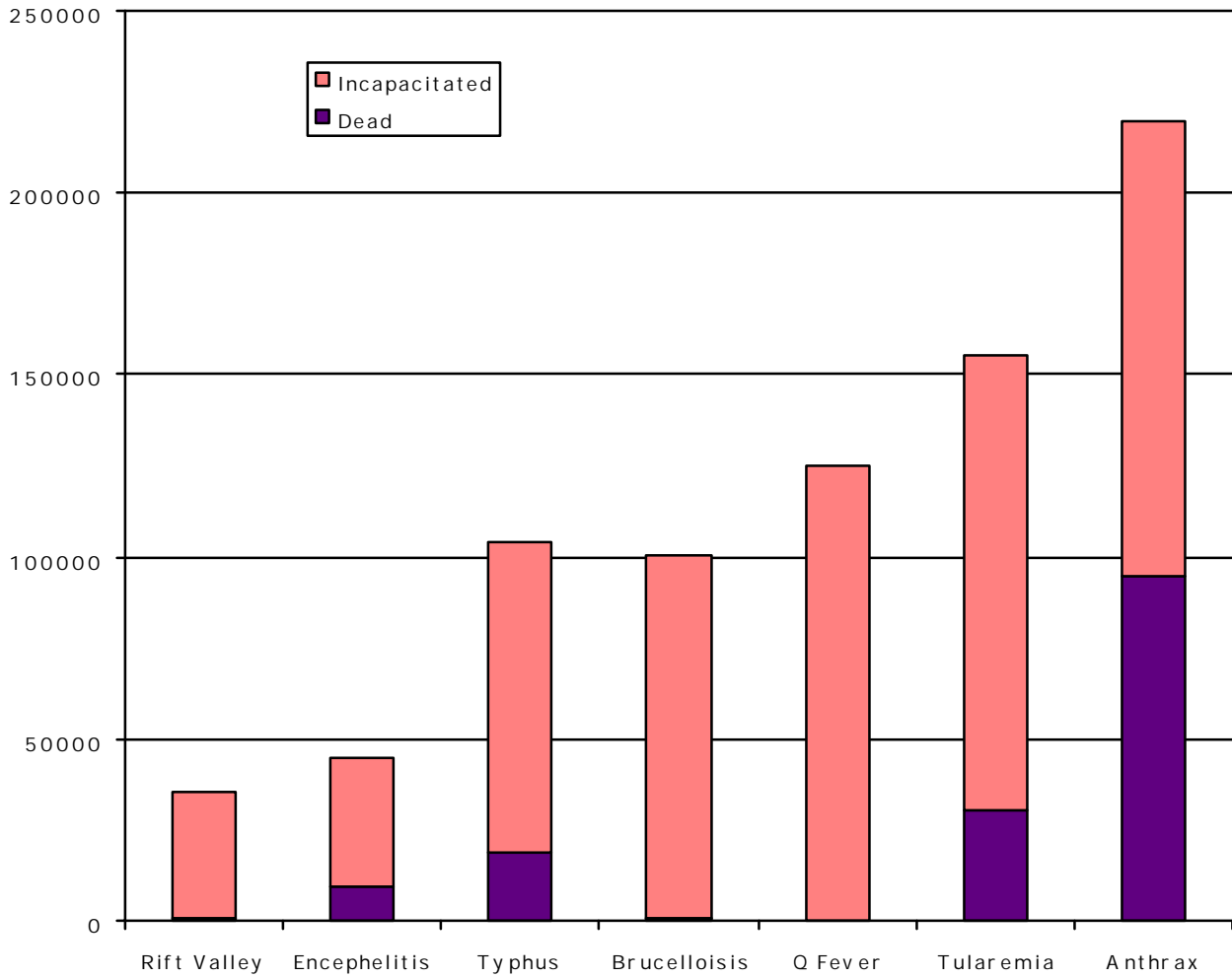
### The Relative Killing Effect of Chemical Weapons Under Different Conditions of Aerosol Delivery

(Numbers of dead from delivery of 1,000 Kilograms)



### The Nominal Lethality of Different Biological Weapons

(Numbers of dead from delivery of 1,000 Kilograms)



<u>Agent</u>	<u>Downwind Reach</u> (kilometers)	<u>Casualties</u>	
		<u>Dead</u>	<u>Incapacitated</u>
Rift Valley Fever	1	400	35,000
Tick-Borne Encephalitis	1	9,500	35,000
Typhus	5	19,000	85,000
Brucellosis	10	500	100,000
Q Fever	20+	150	125,000
Tularemia	20+	30,000	125,000
Anthrax	20++	95,000	125,000

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<sup>1</sup> New York Times, February 1, 2000.

<sup>2</sup> London Sunday Times, February 21, 2000.

<sup>3</sup> London Sunday Times, February 21, 2000.

<sup>4</sup> Associated Press, February 9, 2000, 0154; Washington Post, February 10, 2000, p. A-23; New York Times International, February 8, 2000.