

1800 K Street, NW
Suite 400
Washington, DC 20006

Phone: 1.202.775.3270
Fax: 1.202.775.3199

Web:
www.csis.org/burke/reports



Saudi National Security and the Saudi-US Strategic Partnership:

Part Two: The Conventional Military Balance, Missile Warfare, and the Impact of Weapons of Mass Destruction

Anthony H. Cordesman
Arleigh A. Burke Chair in Strategy

CSIS

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Burke Chair
in Strategy

*Rough Working
Draft: Revised April
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Key Issues Addressed

- **Saudi Arabia defense policies and key threats;**
- **Past, current and future state of the forces shaping security policy and defense trends and needs of Saudi Arabia;**
- **Political influences on Saudi Arabia defense decisions and reactions;**
- **Defense policy decision-making process in Saudi Arabia; and**
- **US engagement with the Saudi Arabia defense departments and adjunct government organizations.**

Saudi Strategic Priorities and Threat Perceptions

Saudi Arabian Security Policies

- *Internal security and stability first.*
- Use diplomacy and aid to secure the Kingdom against neighbors.
- Rely on mix of external powers to deter outside threats while limiting their involvement in Saudi Arabia;
- GCC more image than real.
- Create overlapping security forces for internal security; counterterrorism is critical priority
- Focus military development on outside threats: Iran, Iraq, Yemen; regional challenges like Israel and India
- Focus military forces on airpower and land based air defense, defense of upper Gulf and Yemen, coastal areas, Gulf, and Red Sea. Emerging Gulf and Red Sea fleets.
- Land forces in military cities backed by air bases at critical borders: Yemen-Iraq. Airpower provides strategic mobility, compensates for limited manpower and forces.
- Constantly assess ballistic missile and nuclear threats.

Key Perceived Threats

- **Iran: Nuclear, missiles, Iraq, Non-State Actors, and asymmetric forces in Gulf and region.**
- **Al Qa'ida in Peninsula, terrorist groups.**
- **Yemeni instability, demographics, military threat, border problems;**
- **Shi'ite internal unrest.**
- **Other unrest, sabotage.**
- **Instability or discrediting of Pilgrimage and Saudi role as custodian of Islamic Holy Places.**
- **Threat to oil and gas export routes/imports/chokepoints.**
- **Syria, Lebanon, "Shi'ite crescent"**
- **Israel, Palestinians, and Jordanian stability.**
- **Iraqi stability and border**

Most Likely Foreign Threats Are Not Formal Conflicts

- **Non-State Actors: AQIP and other extremists.**
- **Direct and indirect threats of using force. (I.e. Iranian efforts at proliferation)**
- **Use of irregular forces and asymmetric attacks.**
- **Proxy conflicts using terrorist or extremist movements or exploiting internal sectarian, ethnic, tribal, dynastic, regional tensions.**
- **Arms transfers, training in host country, use of covert elements like Quds force.**
- **Harassment and attrition through low level attacks, clashes, incidents.**
- **Piracy**
- **Limited, demonstrative attacks to increase risk, intimidation.**
- **Strike at critical node or infrastructure.**

Military Threats and the Conventional Balance

The GCC Threat to the GCC

- **Vast lead in military spending and arms imports**
- **Support from US, Britain, France**

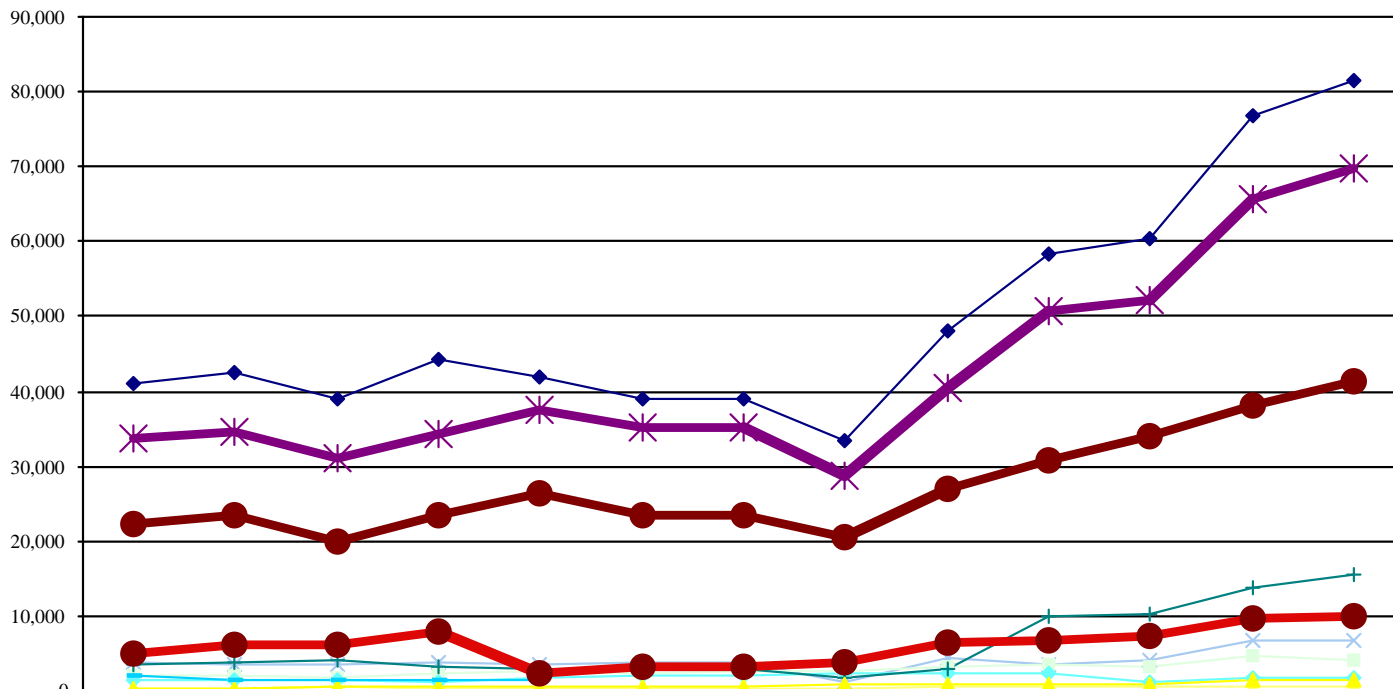
But,

- **Poor Mission Focus with Limited Coordination**
- **Lack of Integration, Standardization**
- **Problems in Large-Scale Exercises and Training; Military Realism**
- **Problems in Jointness – including security services, police, and intelligence – and combined arms.**
- **Lack of Balanced Force Development: Manpower Quality and Sustainability**

Regional Cooperation on Iran?

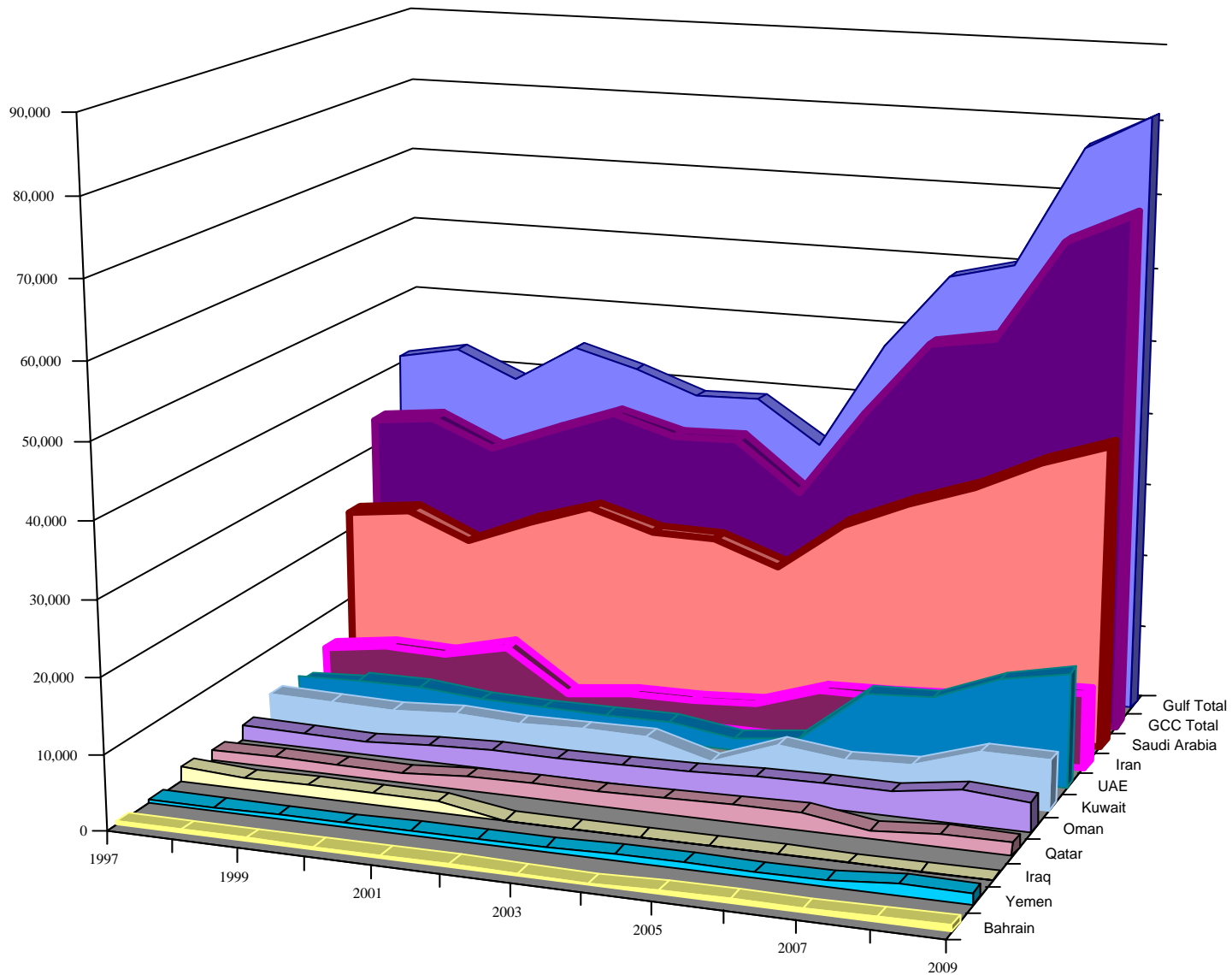
- **Truth is there is limited regional cooperation among the Gulf nations with regards to Iran.**
- **Region-wide drive to bolster naval forces to countering the perceived growing threat from Iran.**
- **Oman, like Syria and Qatar, sees in Iran an important political and economic ally that is too powerful and too potentially dangerous to ignore, let alone antagonize; while defying Egypt, Saudi Arabia and other Arab nations in their efforts to curb Iranian influence and Nuclear ambitions.**
- **United Arab Emirates, which is battling with Iranian leaders over the title to three Persian Gulf islands, has done little to stop billions of dollars in annual trade with Iran.**
- **Sunni-led Arab countries are concerned over Tehran's influence with the Shiite-dominated government in Iraq.**
- **Qatar says it is mediating between Iran and Arab powers such as Egypt and Saudi Arabia, where the ruling family feels threatened by Iranian power.**
- **Continued developments in Saudi and Egyptian outreach to Arab nations to unite against Iranian influence and Nuclear Ambitions as well as outreach efforts to Syria in efforts to break Iranian-Syrian ties.**
- **Continued U.S. engagement and “security umbrella” seems to be key to any resemblance of Regional Cooperation in regards to Iran.**

Comparative Military Spending: 1997-2009

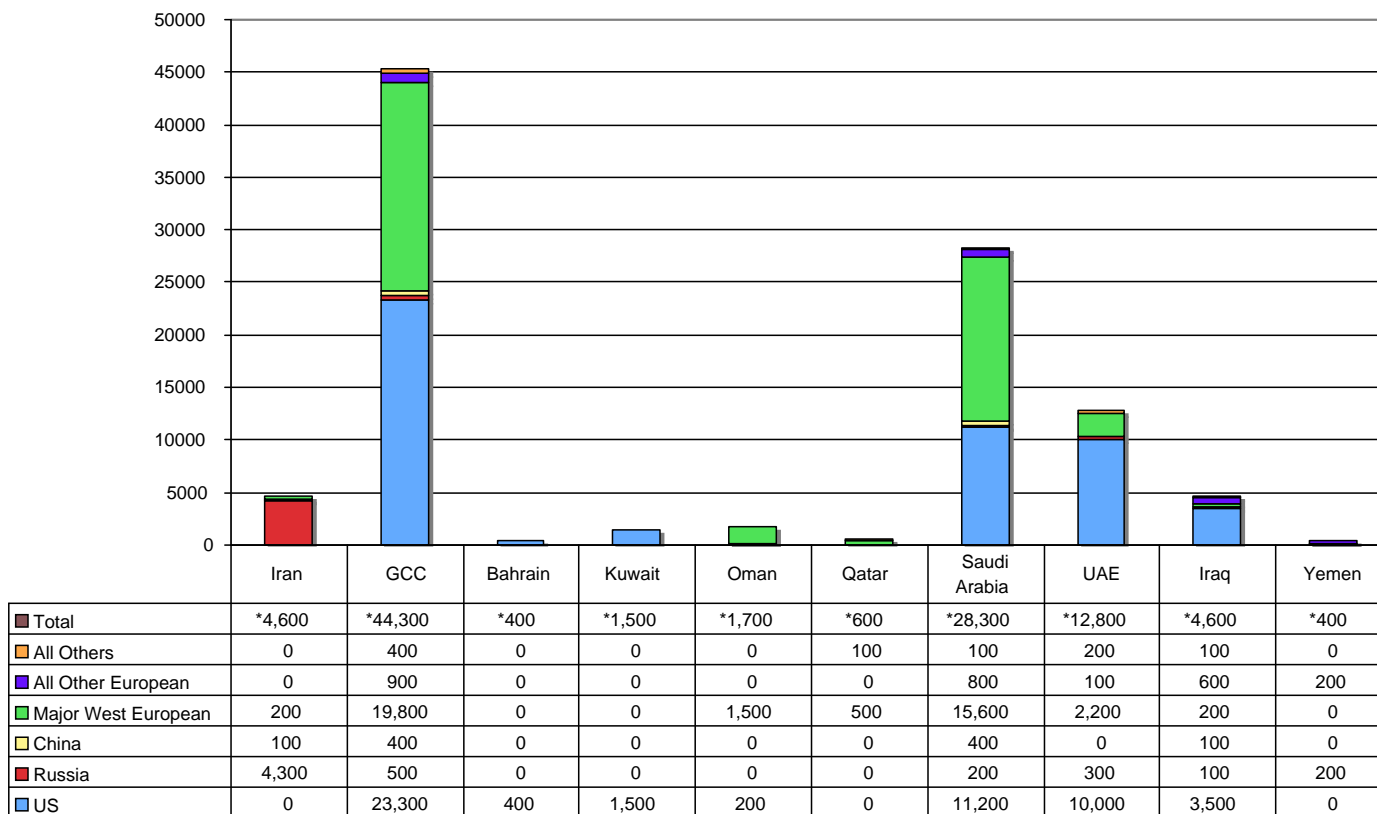


	1997	1998	1999	2000	2001	2002	2003	2004*	2005	2006	2007	2008	2009
Bahrain	387	427	472	342	355	352	350	191	559	498	550	552	697
Kuwait	3,827	3,614	3,401	3,933	3,614	3,720	3,720	1,275	4,539	3,640	4,002	6,810	6,650
Oman	2,126	1,913	1,701	2,232	2,551	2,445	2,657	2,764	3,210	3,410	3,298	4,657	4,060
Qatar	1,382	1,382	1,488	1,275	1,807	2,020	2,020	2,232	2,327	2,430	1,090	1,750	1,750
UAE	3,614	3,933	4,039	3,189	2,976	2,976	2,976	1,701	2,817	9,888	10,292	13,730	15,470
Saudi Arabia	22,323	23,386	19,878	23,386	26,256	23,599	23,599	20,515	27,000	30,810	34,020	38,200	41,200
GCC Total	33,659	34,655	30,979	34,357	37,559	35,112	35,322	28,678	40,452	50,676	52,142	65,699	69,827
Yemen	437	421	456	529	570	547	596	940	1,001	858	927	1,490	1,550
Iraq	1,982	1,382	1,488	1,488	1,488	?	?	?	?	?	?	?	?
Iran	4,996	6,165	6,060	7,972	2,232	3,189	3,189	3,720	6,590	6,759	7,310	9,590	10,000
Gulf Total	41,074	42,623	38,983	44,346	41,849	38,848	39,107	33,338	48,043	58,290	60,379	76,779	81,377

Comparative Military Spending: 1997-2008



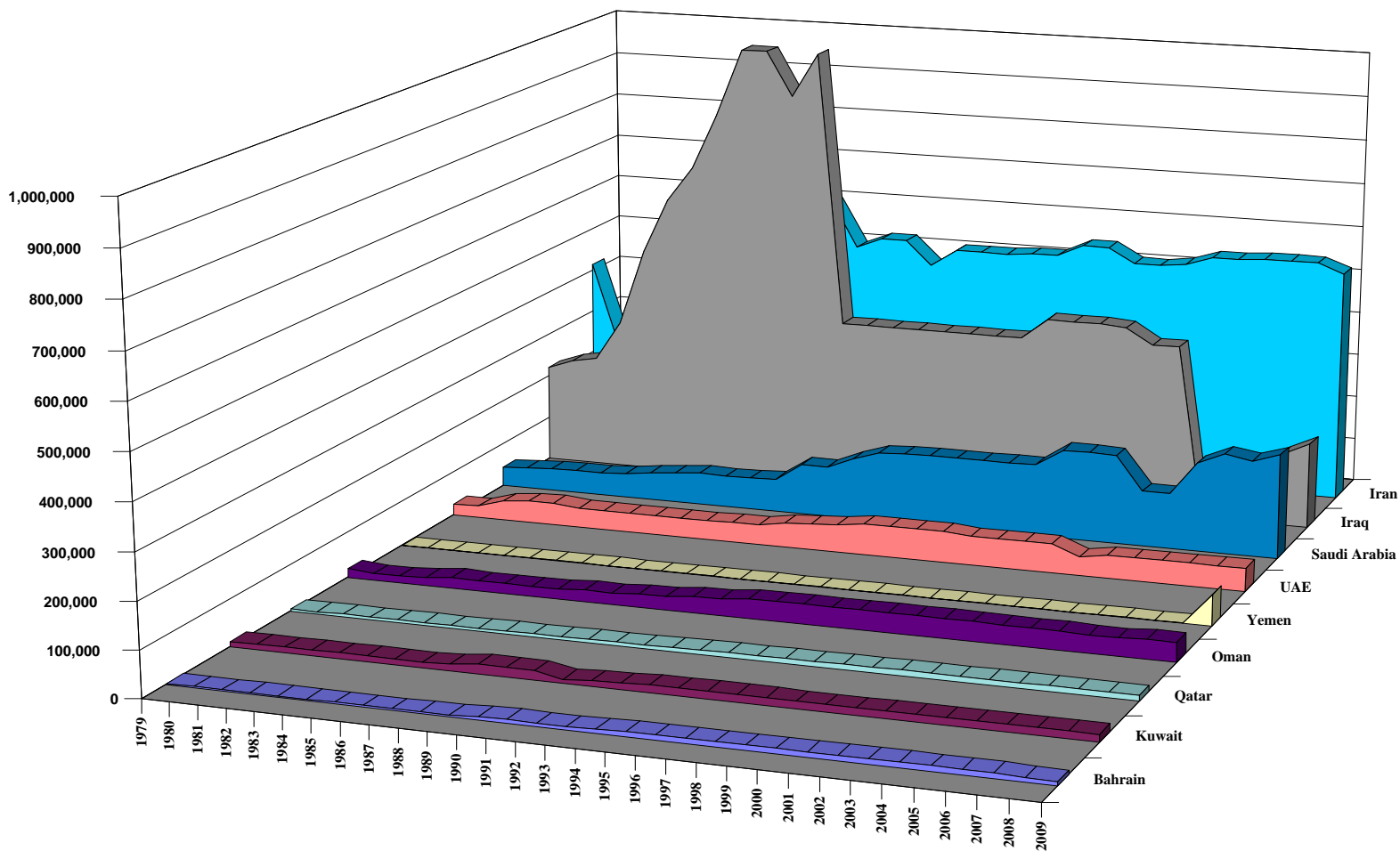
New Arms Orders by Supplier: 2005-2008



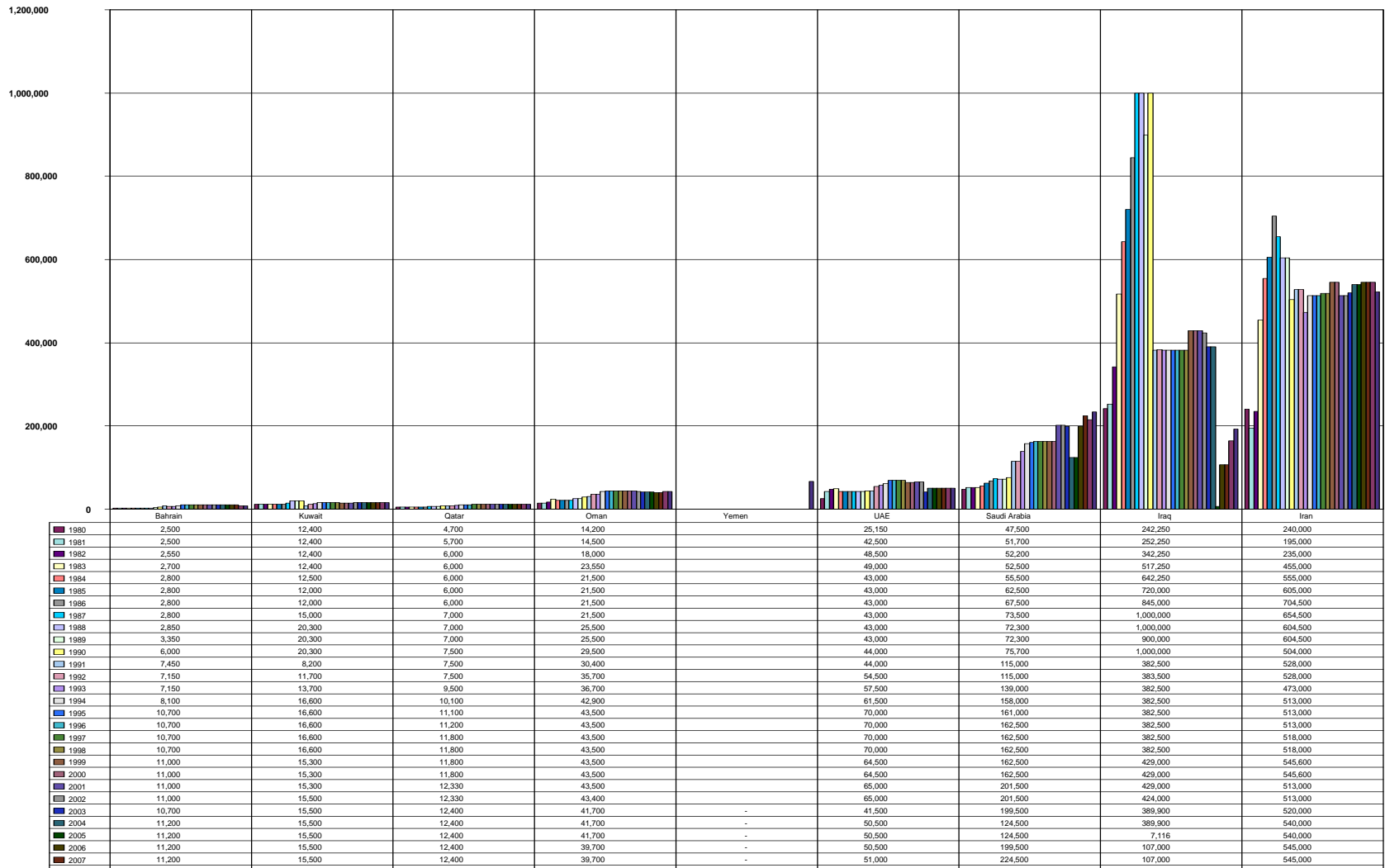
0 = Data less than \$50 million or nil. All data rounded to the nearest \$100 million.

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

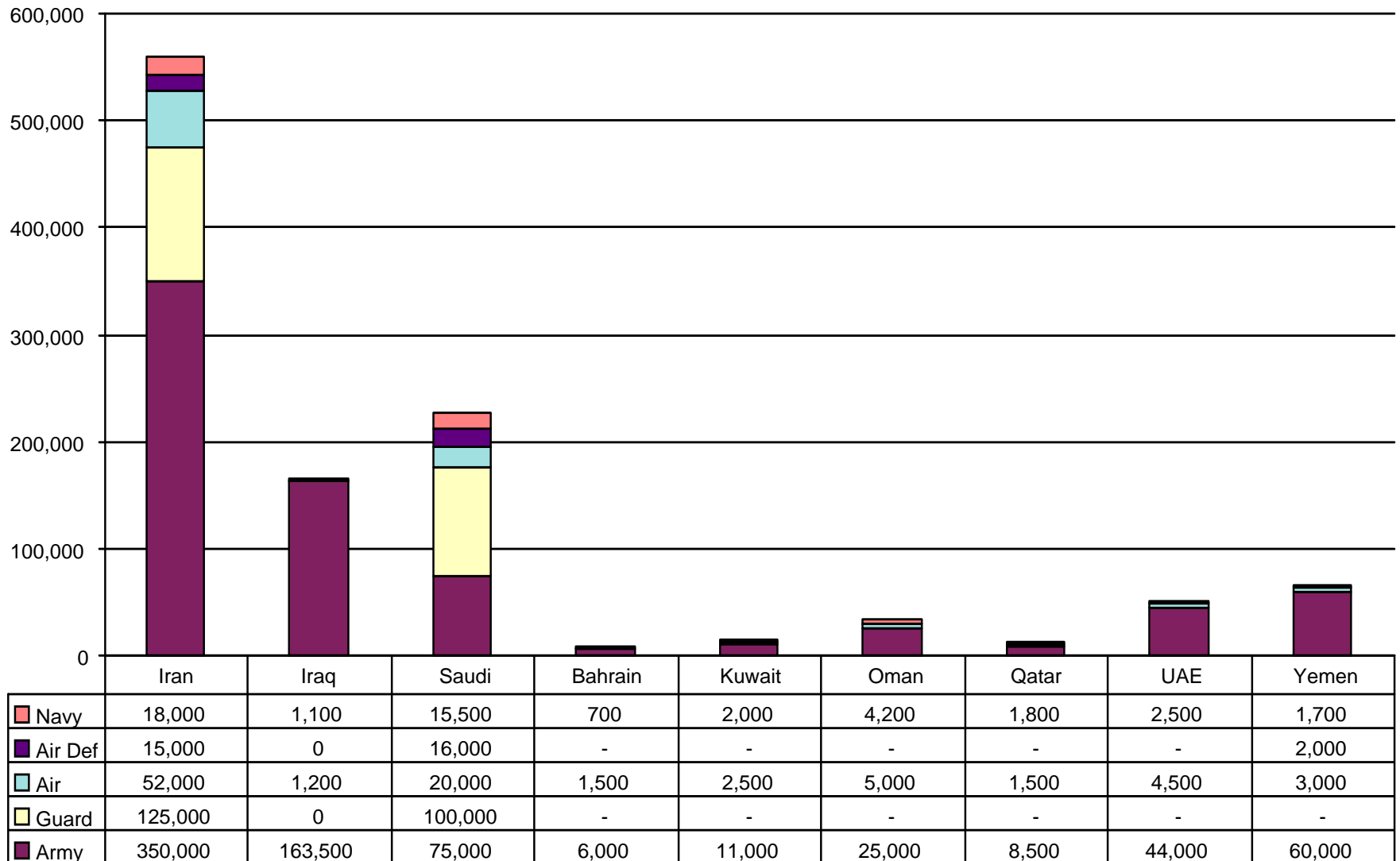
Comparative Military Manpower Trends



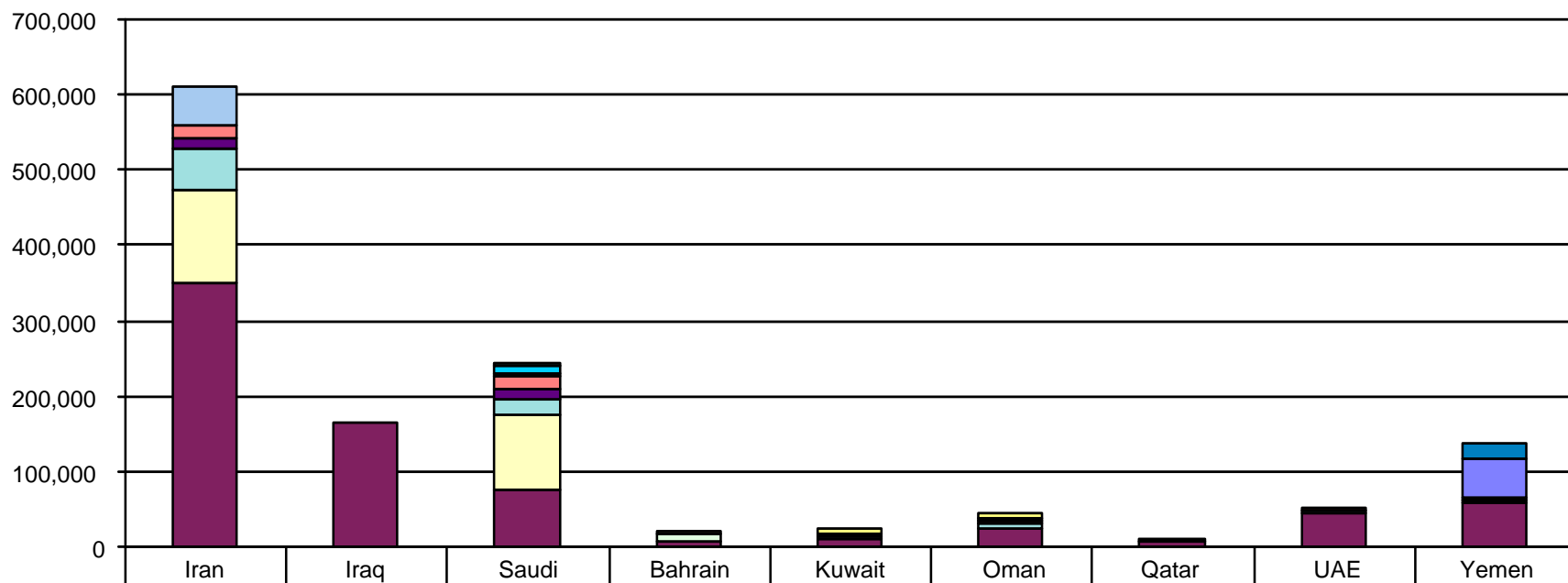
Comparative Military Manpower Trends



Comparative Military Manpower: 2010



Comparative Paramilitary Manpower: 2010



	Iran	Iraq	Saudi	Bahrain	Kuwait	Oman	Qatar	UAE	Yemen
Basij	*								
Other	50,000								
Guard				2000	6,600	6,400			
Police				9,000					
Special Security			500						
Border Guard			10,500						
Coastguard			4,500	260	500	400		800	1,200
Tribal Levies						4,000			20,000
MOI Forces									50,000
Navy	18,000	1,100	15,500	700	2,000	4,200	1,800	2,500	1,700

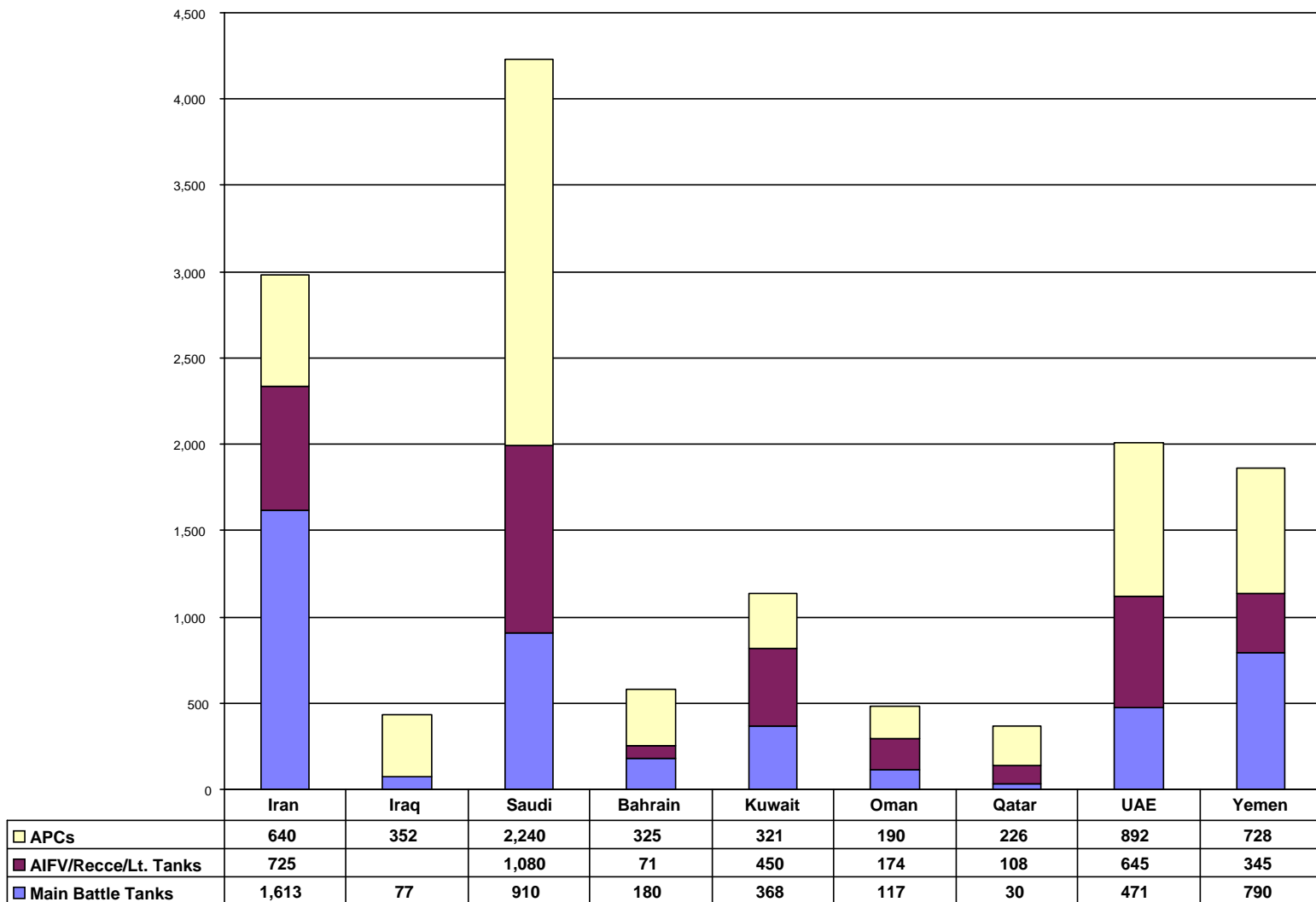
Land Force Threats

- **Iranian Threat to Kuwait and Iraq**
- **Iranian permissive amphibious/ferry operation.**
- **Iranian dominance of Iraq; Invited In to Replace US?**
- **Spillover of Iraqi Sunni-Shi'ite power struggles.**
- **Yemeni incursion into Saudi Arabia or Oman**

But:

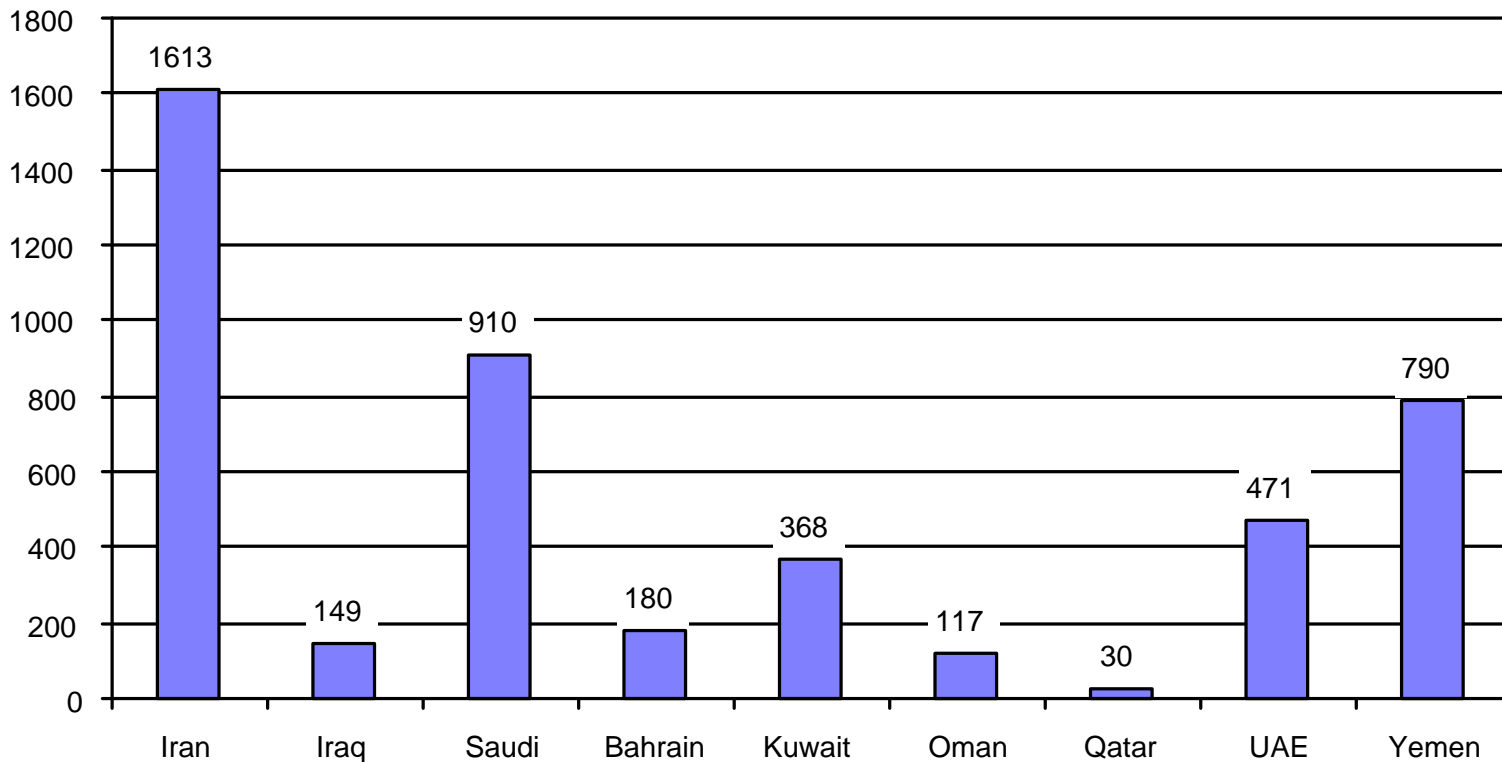
- *Low near-term probability.*
- *High risk of US and allied intervention.*
- *Limited threat power projection and sustainability.*
- *Unclear strategic goal.*

Comparative Armored Vehicle Strength in 2010



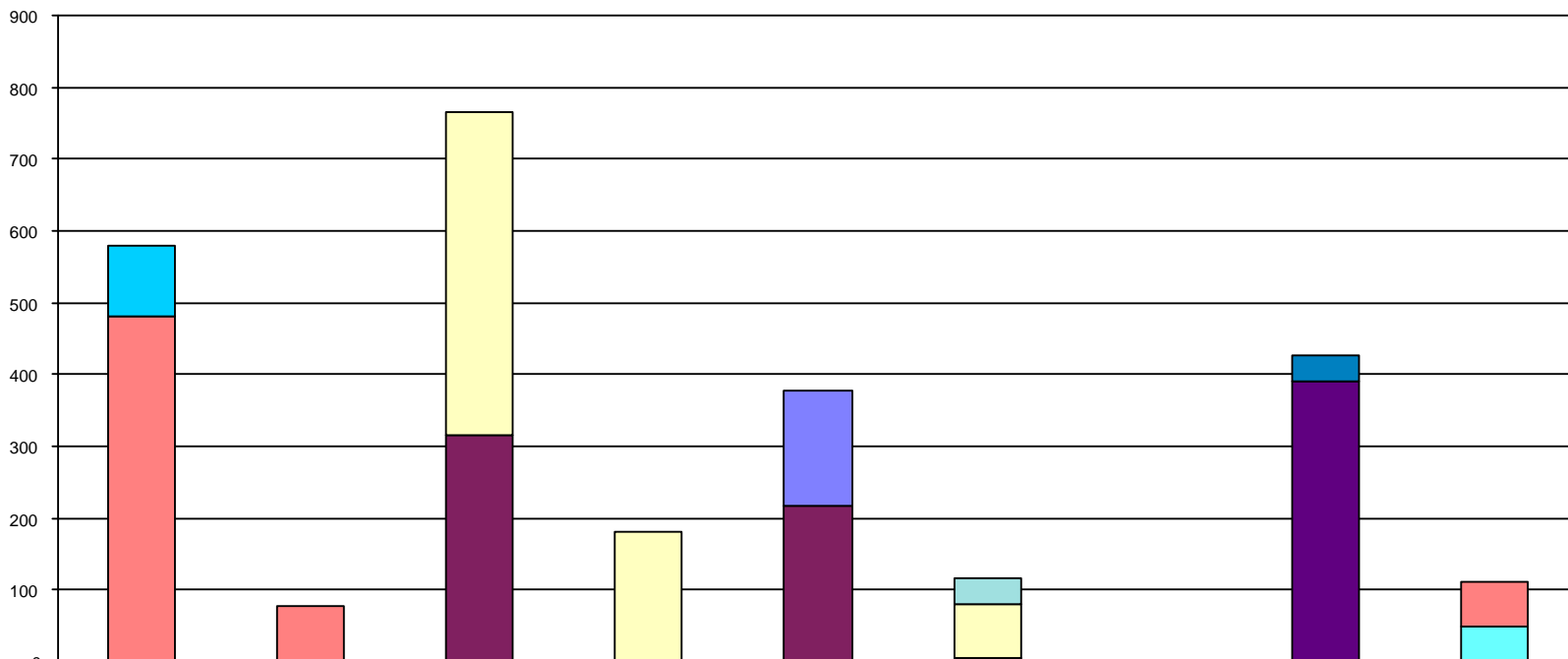
Source: Estimated by Anthony H. Cordesman using data from various editions of the IISS *The Military Balance* and Jane's *Sentinel*.

Comparative Main Battle Tank Inventory, Regardless of Age or Quality



Derived from IISS, Military Balance, various editions and Jane's

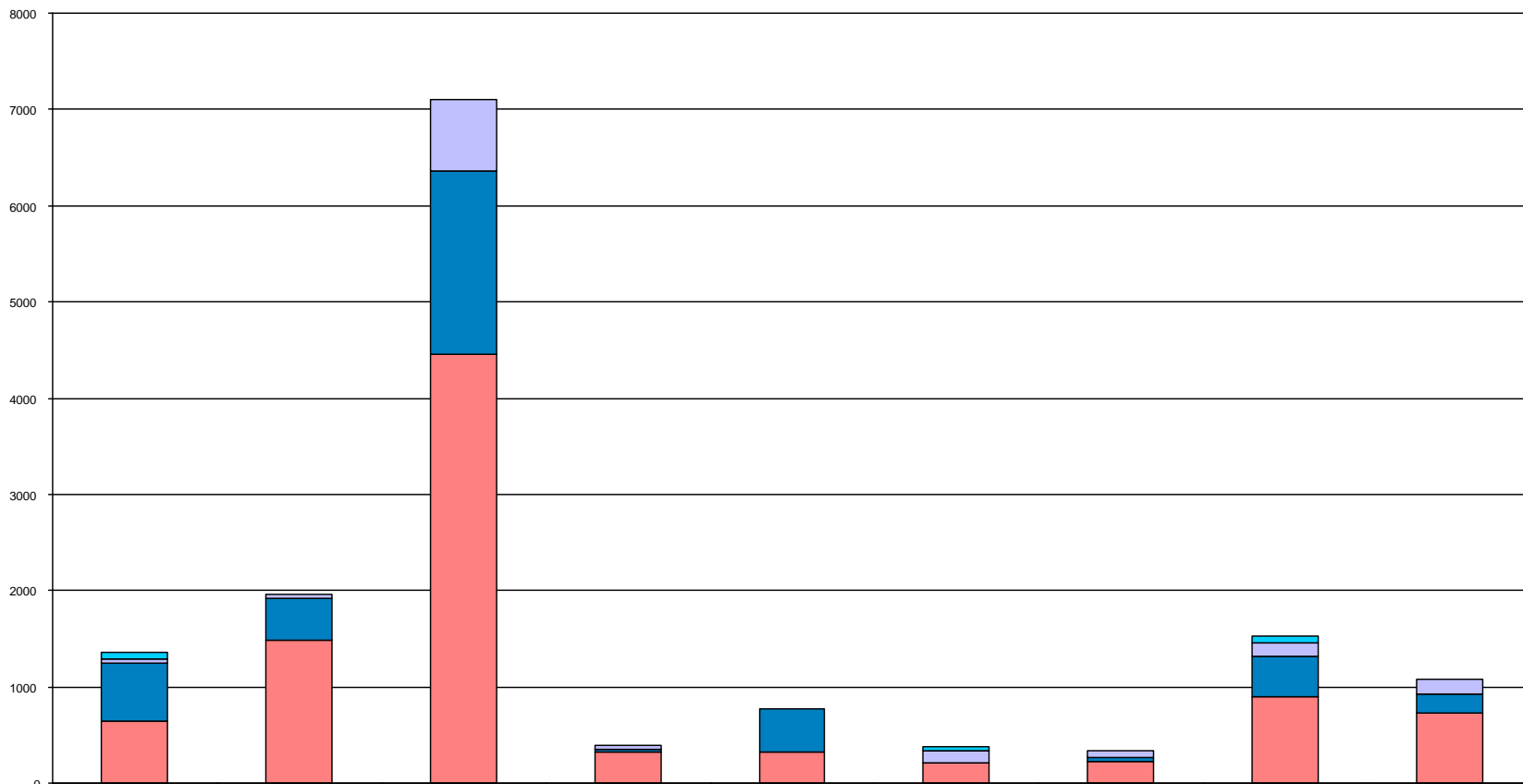
Comparative Modern Tank Strength, 2010



	Iran	Iraq	Saudi	Bahrain	Kuwait	Oman	Qatar	UAE	Yemen
Zulfiqar	100								
OF-40								36	
T-72	480	77							60
M-84					159				
Leclerc								390	
Challenger 2						38			
M-60A3			450	180		73			
M-60A1						6			50
M-1A2			315		218				

Source: Estimated by Anthony H. Cordesman using data from the IISS, The Military Balance, various editions.

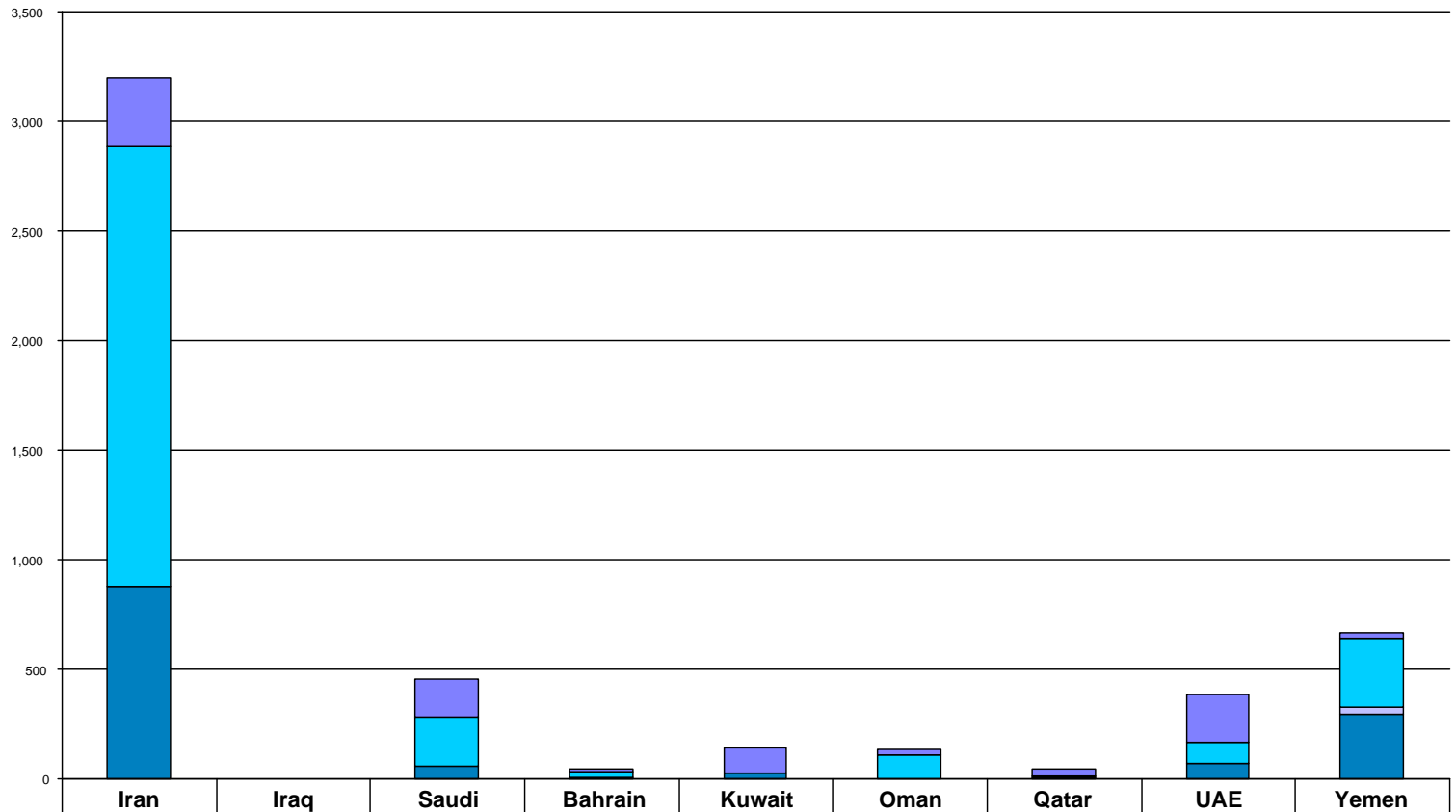
Comparative Other Armored Vehicles Strength in 2010



	Iran	Iraq	Saudi	Bahrain	Kuwait	Oman	Qatar	UAE	Yemen
Light Tanjk	80					37		76	
Recce	35	53	750	46		137	68	129	145
AIFV/AFV	610	434	1,897	25	450		40	430	200
APC	640	1,479	4,460	325	321	206	226	892	728

Derived from IISS, Military Balance, and Jane's

Comparative Artillery Strength in 2010



	Iran	Iraq	Saudi	Bahrain	Kuwait	Oman	Qatar	UAE	Yemen
Self-Propelled Tube	310		170	13	113	24	28	221	25
Towed Tube	2,010		225	26	0	108	12	93	310
Assault and Coastal	0		0	0	0	0	0	0	36
Multiple Rocket Launcher	876		60	9	27		4	72	294
Mortar	*5,000	*4	*400		*78	*101	*45	*155	*510

Derived from IISS, Military Balance, and Jane's

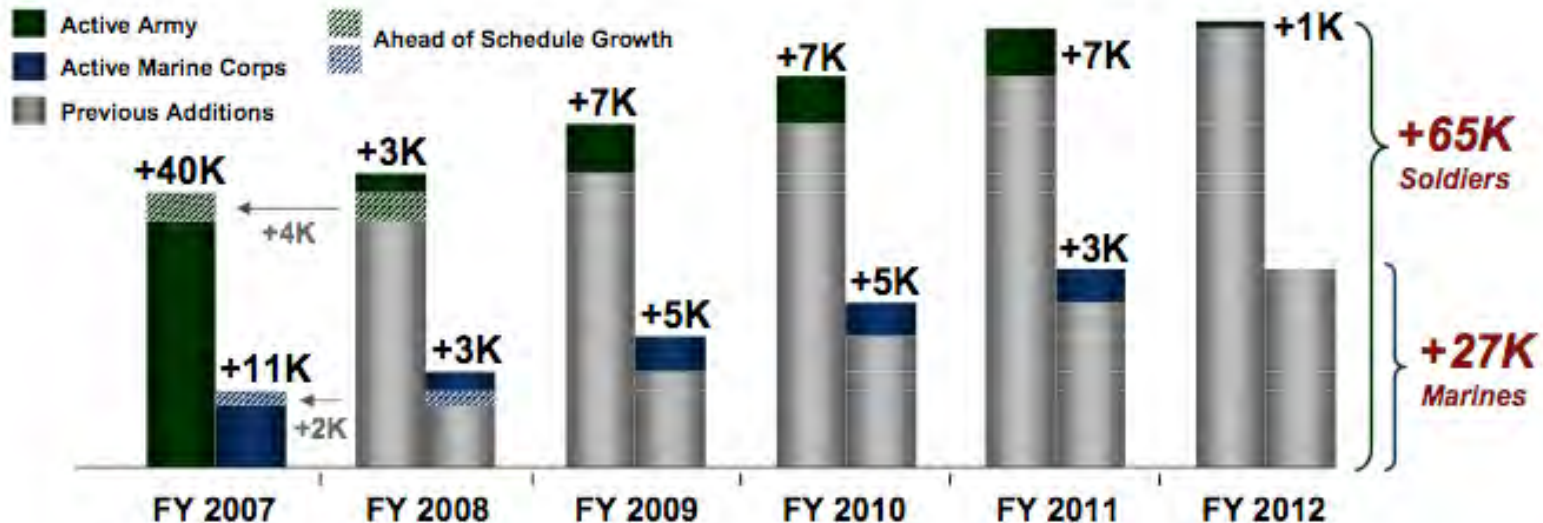
Keeping a Decisive US Qualitative Edge in US Forces and Arms Transfers to the Gulf (\$10.5B in FY087 & FY09)

Joint Ground Capabilities	Joint Maritime Capabilities	Joint Air Capabilities	Space-based Capabilities
<ul style="list-style-type: none"> - Future Combat Systems: <ul style="list-style-type: none"> • Ground and air systems - 119 Stryker Vehicles - 5,249 High Mobility Multi-purpose Wheeled Vehicles - 1,061 Heavy Tactical Vehicles - 3,187 Medium Tactical Vehicles - 29 M1A1 Abrams Tank Upgrades - Chemical Weapons Demilitarization 	<ul style="list-style-type: none"> - CVN 21 Carrier Replacement - 1 Virginia Class Submarine - 1 DDG-1000 Destroyer - 2 Littoral Combat Ships - 2 T-AKE Auxiliary Dry Cargo Ships - CVN Refueling Complex Overhaul - 2 Joint High Speed Vessels 	<ul style="list-style-type: none"> - 16 F-35 Joint Strike Fighters - 20 F-22A Raptors - 36 V-22 Ospreys - 23 F/A-18 Hornets - 22 E/A-18G Growlers - 16 CH-47 Chinooks - VH-71 Helicopter - KC-X Aerial Refueling Tanker - 59 Predators, Reapers and Warriors 	<ul style="list-style-type: none"> - 2 Space Based Infrared Systems - 4 Expendable Launch Vehicles - GPS Satellite - 1 Mobile User Objective System - Transformational Satellite - Advanced Extremely High Frequency Satellite - Wideband Global SATCOM - Ballistic Missile Defense
<p><i>Basic Research +\$0.3B in FY 2009 (+\$1.4B FY09-FY13)</i></p>			

Increase Ground Capabilities

+\$8.7B
FY08 - FY09

Army Active	42	Brigade Combat Teams (482.4K Soldiers)	➔	48	Brigade Combat Teams (547.4K Soldiers)
	12/12	Months Home Station / Months Deployed		24/12	Months Home Station / Months Deployed
Marine Corps Active	2.5	Marine Expeditionary Forces (175K Marines)	➔	3	Marine Expeditionary Forces (202K Marines)
	7/7	Months Home Station / Months Deployed		14/7	Months Home Station / Months Deployed



Source: FY 2009 DoD Budget Request; FY 2008 Budget; FY 2007 Supplemental

Numbers may not add due to rounding

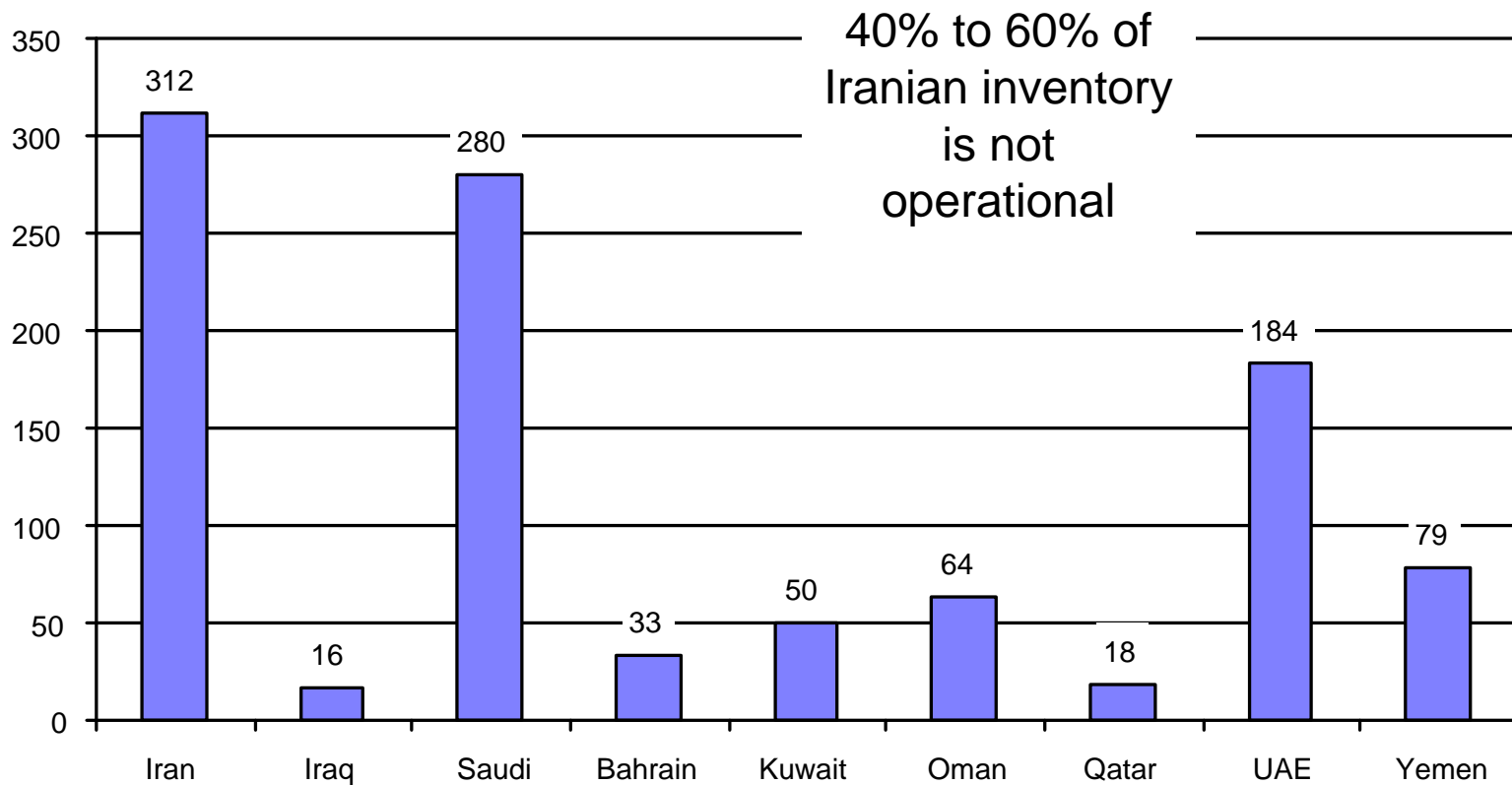
Air/Missile Threats

- **Precision air strikes on critical facilities: Raid or mass attack.**
- **Terror missile strikes on area targets; some chance of smart, more accurate kills.**
- **Variation on 1987-1988 “Tanker War”**
- **Raids on offshore and critical shore facilities.**
- **Strikes again tankers or naval targets.**
- **Attacks on US-allied facilities**
- **Use of UAVs as possible delivery systems (conventional or Unconventional munitions)**

But:

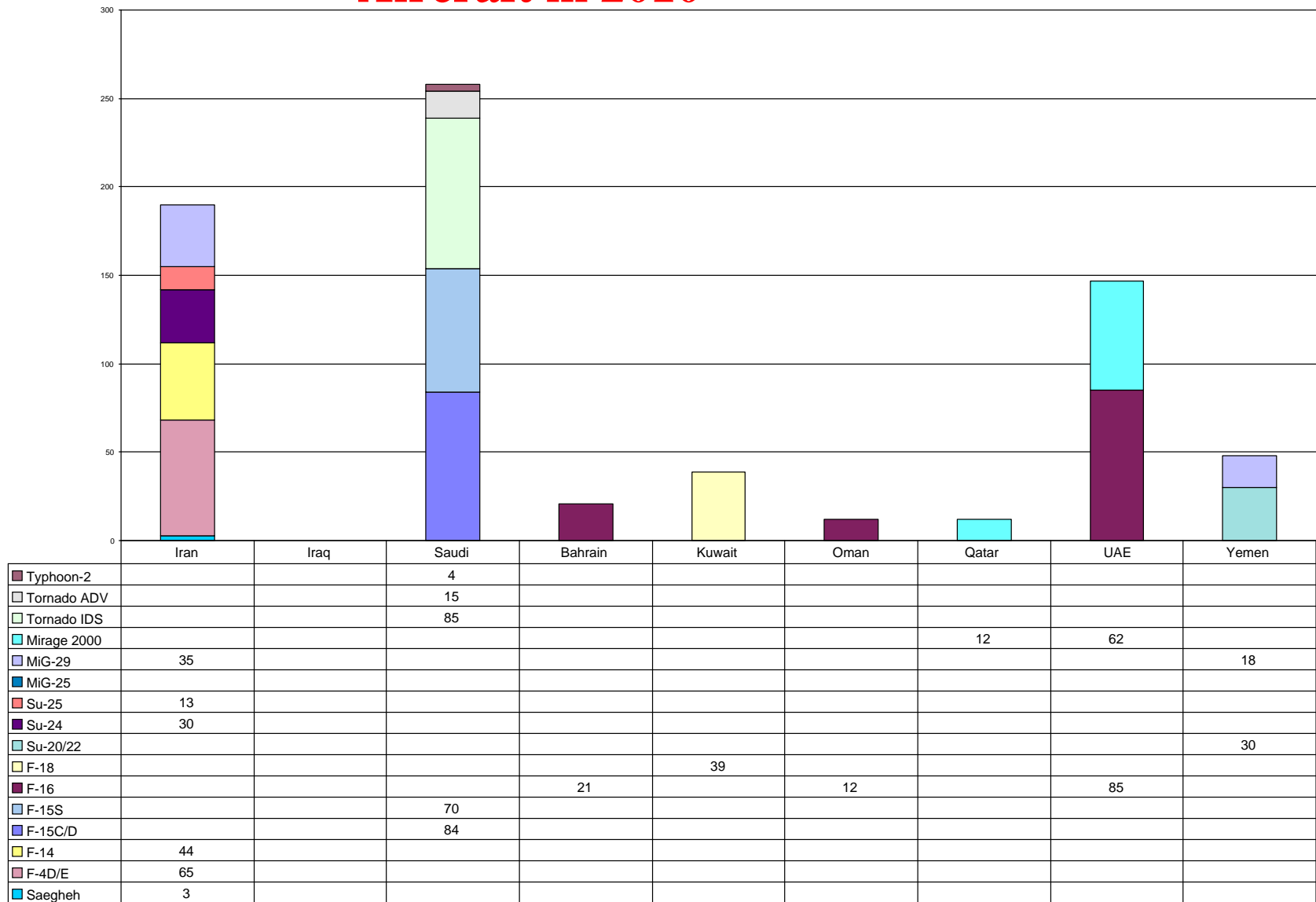
- *Low near-term probability.*
- *High risk of US and allied intervention.*
- *Limited threat power projection and sustainability.*
- *Unclear strategic goal.*

Comparative Combat Air Strength in 2010



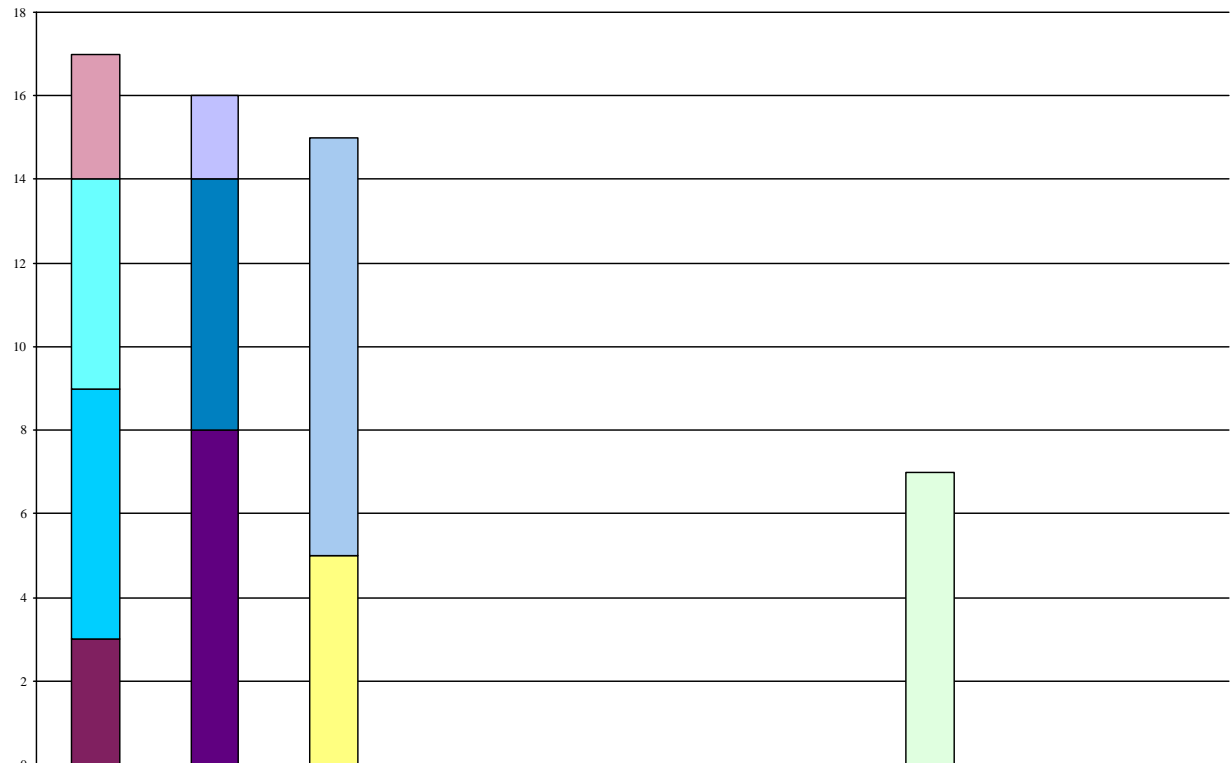
Derived from IISS, Military Balance, and Jane's

Comparative High Quality Fighter/Attack Aircraft in 2010



Source: Adapted by Anthony H. Cordesman from various sources and IISS, The Military Balance, various editions and Saudi experts.

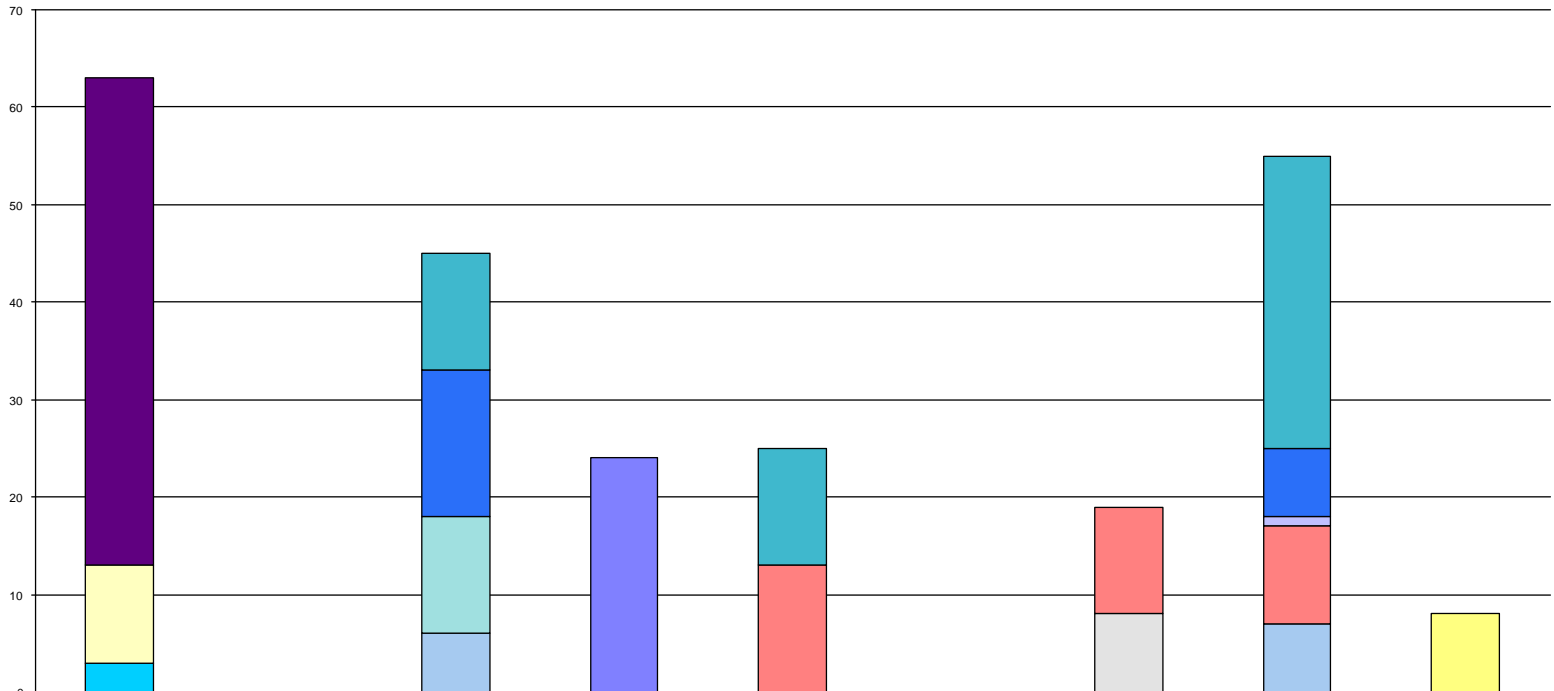
Comparative Gulf AC&W, ELINT, and Reconnaissance Aircraft, 2010



	Iran	Iraq	Saudi	Bahrain	Kuwait	Oman	Qatar	UAE	Yemen
P-F3 Orion	3								
P-3MP Orion	5								
Tornado IDS			10						
E-3A AWACS			5						
Mirage 2000 RAD							7		
RF-4E	6								
Da-20 Falcon ELINT	3								
SB7L-360		2							
Cessna 208B		6							
CH-2000		8							

Source: Adapted by Anthony H. Cordesman from IISS, The Military Balance, various editions.

Comparative Gulf Armed Helicopters: 2010



	Iran	Iraq	Saudi	Bahrain	Kuwait	Oman	Qatar	UAE	Yemen
AH-64/AH-64D			12		12			30	
AS-565			15					7	
AS-550C3								1	
AS-532 Exocet			12						
SA-342 HOT					13		11	10	
AH-1J	50								
AH-1E				24					
SH-3D	10								
Commando Exocet							8		
AS-332 Exocet			6					7	
Mi-35 Hind									8
RH-53D	3								

Iranian UAV Projects / Assets 2009

Prime Manufacturer	Designation	Development / Production	Operation	Payload Wt.	Endurance (hr)	Range	Ceiling (ft)	Mission
Unknown	Stealth	Underway / Underway	Deployed			700 km		R/S*
HESA	Ababil (Swallow)	Complete / Underway	Deployed	45 kg	1.5+	150 km	14,000	Multiple variants for R/S* - attack - ISR**
Shahbal Group, Sharif Univ.	Shahbal	Underway		5.5 kg		12 km	4,500	R/S*
Asr-e Talai Factories	Mini-UAV	Underway						Surveillance
FARC	Sobakbal	Underway / Underway	Deployed	0.35 kg	2	2.7 - 13.5 mi	19,686	Surveillance
Qods Aeronautics Industries	Mohajer II/III (Dorna); Mohajer IV (Hodhod); Saeqeh I/II; Tallash I/Endeavor; Tallash II Hadaf 3000	Complete / Underway	Deployed					Multirole aka Lightning Bolt Target drone - aka Target 3000

Source: Adapted by Adam C. Seitz from AIAA Aerospace 2009 Worldwide UAV Roundup; available at: http://www.aiaa.org/Aerospace/images/articleimages/pdf/UAVs_APR2009.pdf.

*R/S: Reconnaissance / Surveillance; **ISR: Intelligence / Surveillance / Reconnaissance

Gulf Air Balance

Air Bases and Air Force Order of Battle (2009)



Three Main Iranian Nuclear Facilities

- Natanz: Uranium Enrichment Facility
- Arak: Heavy Water Nuclear Reactor and Possible Future Plutonium Production Reactor
- Esfahan: Nuclear Research Center. Uranium Conversion Facility (UCF)

	Combat A/C	Attack Helo's
Iran	319	95
Iraq	-	37
Kuwait	50	45
Bahrain	33	16
Qatar	18	25
UAE	184	67
Oman	64	41
Saudi Arabia	278	67
Yemen	179	18

Iran Airbases

Tabriz	F-5E/F, MiG-29
Hamadan	F-4E/D Su-24
Dezful	F-5E/F
Bushehr	F-4E/D F-14
Bandar Abbas	2 Helicopter Wings
Shiraz	Su-25 Su-24
Esfahan	F-5E Su-24
Tehran	MiG-29 Su-24
Zahedan	F-7M
Kermanshah	F-5E/F

Air Bases Source: Global Security.org
 Order of Battle Source: Anthony Cordesman CSIS

Range of Iran's Air Power



Mission Profile: Hi-Lo-Hi

F-4E (Bushehr):
(4) MK83 1000lb Bombs
(1) 600 Gallon Fuel Tank
10 Minutes loiter time
Range = 400 nmi

SU-24 (Shiraz):
(4) 500 kg/1000 lb Bombs
(1) 400 gallon tank
10 minutes loiter time
Range = 590 nmi

SU-25 (Shiraz):
(4) 500kg/1000lb Bombs
(1) 400 gallon tank
(2) 10 minutes loiter time
Range = 600 nmi

Gulf Land-Based Air Defenses In 2010

Country	Major SAM	Light SAM	AA Guns
Bahrain	8 I Hawk MIM-23B	60 RBS-70 18 FIM-92A Stinger 7 Crotale	27 guns 15 Oerlikon 35 mm 12 L/70 40 mm
Iran	16/150 I Hawk 3/10 SA-5 45 SA-2 Guideline	SA-7/14/16, HQ-7 29 SA-15 Some QW-1 Misaq 29 TOR-M1 Some HN-5 5/30 Rapier 10 Pantsyr (SA-22) Some FM-80 (Ch Crotale) 15 Tigercat Some FIM-92A Stinger	1,700 Guns ZSU-23-4 23mm ZPU-2/4 23mm ZU-23 23mm M-1939 37mm S-60 57mm ZSU-57-2
Iraq			
Kuwait	5/24 I Hawk Phase III 5/40 Patriot PAC-2	12 Aspide 12 Starburst Aspide Stinger	12 Oerlikon 35mm
Oman	None	Blowpipe 8 Mistral 2 SP 12 Panstysr S1E	26 guns 4 ZU-23-2 23 mm 10 GDF-005 Skyguard 35
mm		34 SA-7 6 Blindfire S713 Martello 20 Javelin 40 Rapier	12 L-60 40 mm
Qatar	None	10 Blowpipe 12 FIM-92A Stinger 9 Roland II 24 Mistral 20 SA-7	?
Saudi Arabia	16/128 I Hawk 4-6/16-24 Patriot 2 17/73 Shahine Mobile	40 Crotale 500 Stinger (ARMY) 500 Mistral (ADF)	1,220 guns 92 M-163 Vulcan 20 mm 30 M-167 Vulcan 20 mm
(NG)	16/96 PAC-2 launchers 17 ANA/FPS-117 radar 73/68 Crotale/Shahine	500 FIM-43 Redeye 500 Redeye (ADF) 73-141 Shahine static	850 AMX-30SA 30 mm 128 GDF Oerlikon 35mm 150 L-70 40 mm (in store) 130 M-2 90 mm (NG)
UAE	2/6/36 I Hawk	20+ Blowpipe 20 Mistral Some Rapier Some Crotale Some RB-70 Some Javelin Some SA-18	62 guns 42 M-3VDA 20 mm SP 20 GCF-BM2 30 mm
Yemen	Some SA-2, 3 Some SA-6 SP	Some 800 SA-7 Some SA-9 SP Some SA-13 SP Some SA-14	530 guns 20 M-163 Vulcan SP 20mm 50 ZSU-23-4 SP 23 mm 100 ZSU-23-2 23 mm 150 M-1939 37 mm 50 M-167 20mm 120 S-60 57 mm 40 M-1939 KS-12 85 mm

Source: Adapted by Anthony H. Cordesman from IISS, [The Military Balance](#), [Periscope](#), JCSS, [Middle East Military Balance](#), [Jane's Sentinel](#) and [Jane's Defense Weekly](#). Some data adjusted or estimated by the author.

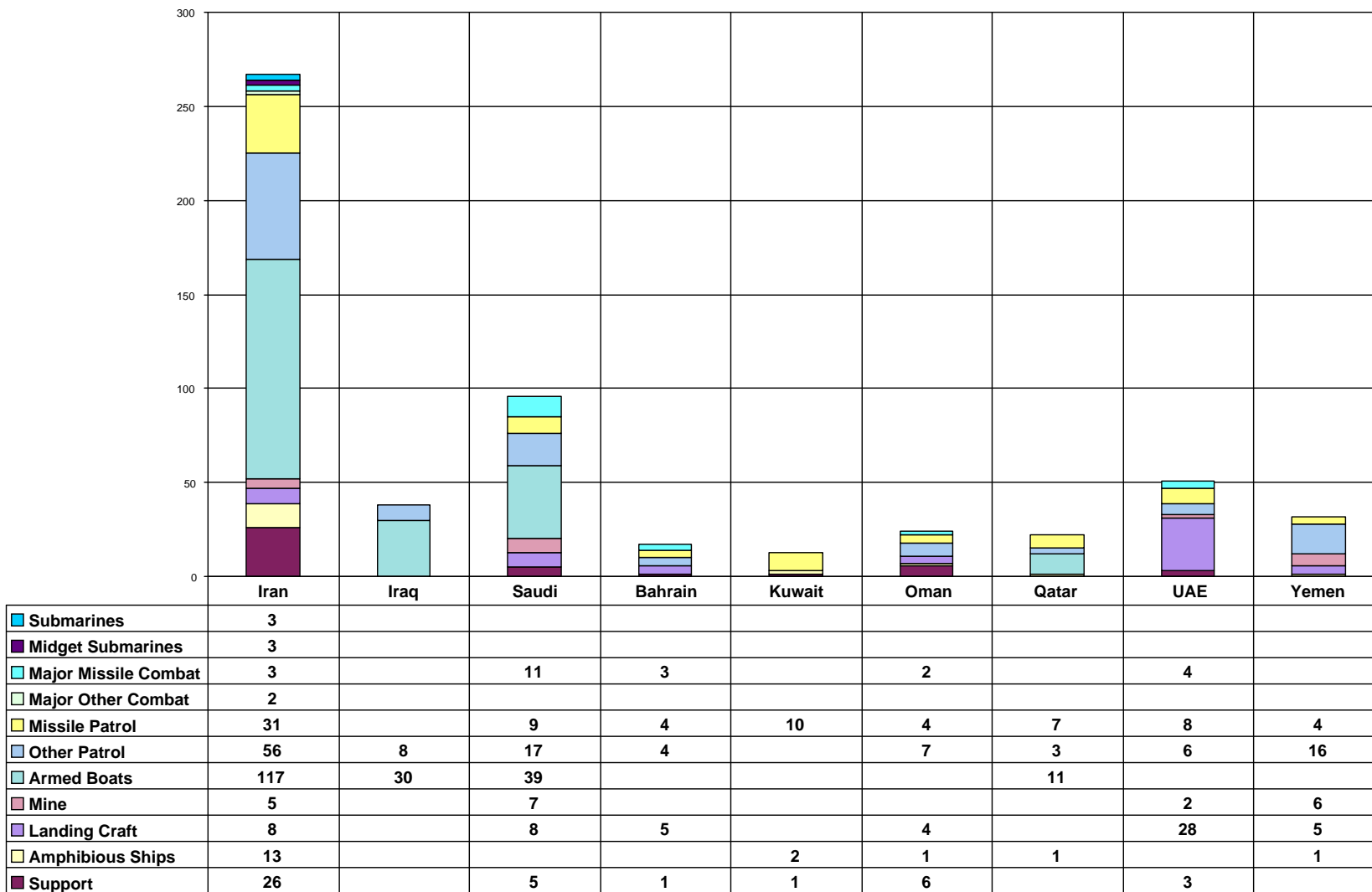
Naval Threats

- Iranian effort to “close the Gulf.”
- Iranian permissive amphibious/ferry operation.
- Variation on 1987-1988 “Tanker War”
- Raids on offshore and critical shore facilities.
- “Deep strike” with air or submarines in Gulf of Oman or Indian Ocean.
- Attacks on US facilities

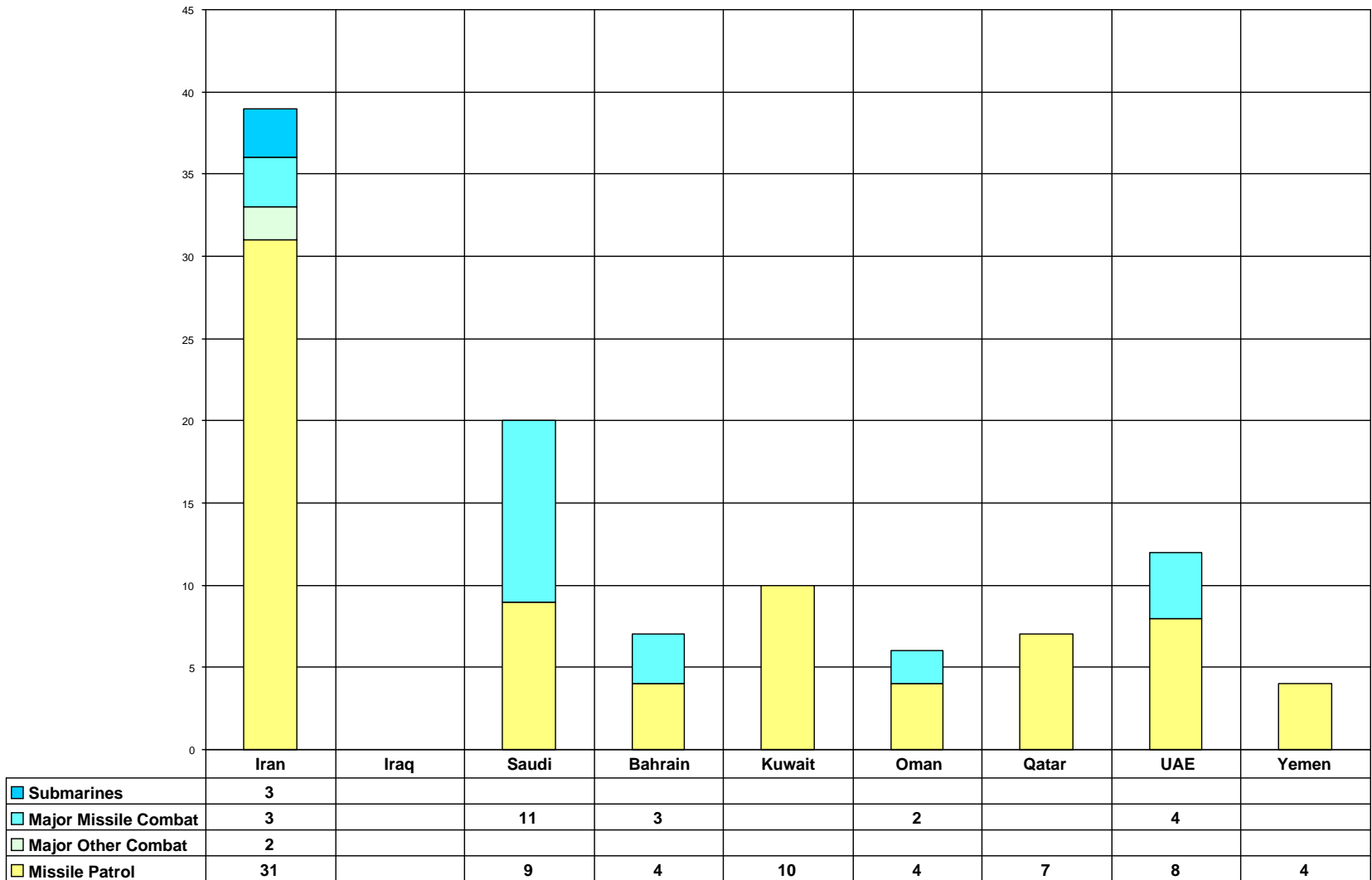
But:

- *Low near-term probability.*
- *High risk of US and allied intervention.*
- *Limited threat power projection and sustainability.*
- *Unclear strategic goal.*

Comparative Naval Combat Ships in 2010



Major Combat Warships in 2010



Source: Adapted by Anthony H. Cordesman from IISS, *The Military Balance*, various editions and material provided by US and Saudi experts.

The Challenge of Missile Warfare

What Is The Threat?

- **Intimidation and Deterrence?**
- **Test, development, rolling future threat?**
- **Conventional Warhead, Uncertain Reliability, Poor CEP/Accuracy?**
- **Conventional Warhead, High accuracy, maneuvering capability?**
- **Chemical Warhead?**
- **Possible nuclear warhead?**
- **Tested Nuclear warhead?**
- **Ballistic + cruise threat?**
- **Volley or Limited Rate/numbers?**
- **Sheltered or mobile basing?**
- **Launch on warning (LOW), Launch under attack (LUA)?**

Iranian Missile Threat

• **Long-Range Ballistic Missiles**

- New Intermediate Range Ballistic Missile or Space Launch Vehicle (SLV) in development
- Likely to develop ICBM/SLV ... could have an ICBM capable of reaching the U.S. before 2015



Shahab 3/3A

Range (km)	Payload (kg)
1,350	1,158
1,400	987
1,500	760
1,540	650
1,560	590.27
1,580	557.33
1,600	550
1,780	240
2,000	-

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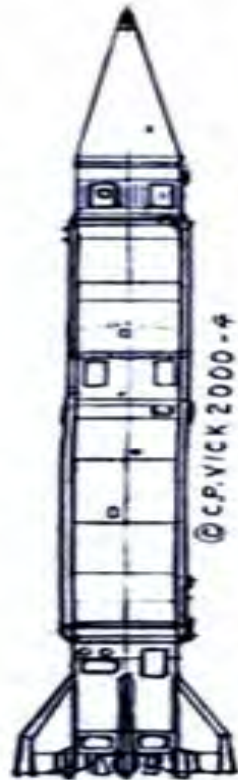
(Source: Missile Defense Program Overview for the European Union, Committee on Foreign Affairs, Subcommittee on Security and Defense. Dr. Patricia Sanders, Executive Director, Missile Defense Agency)

Iranian Missile Program

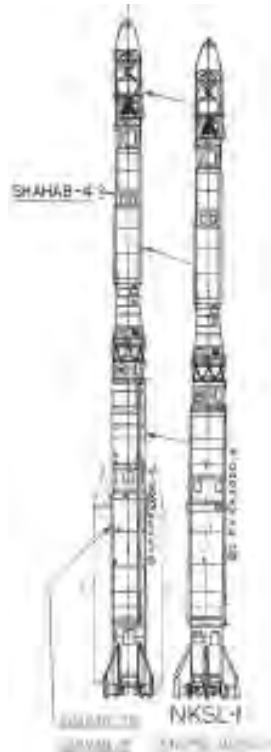
Shahab-3



No Dong



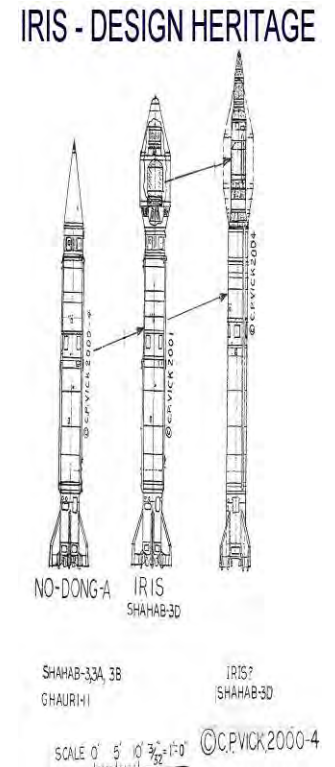
Shahab-4



Variant



IRIS



<u>Range</u>	1,300	1,300	2,000	2,000	3,000
<u>Payload</u>	~1,000	700-1000	?	700	~1,000
<u>IOC</u>	2002	?	?	?	2005

Estimated Iranian Missile Ranges



Source: NASIC, B&CM Threat 2006, Jacoby Testimony March 2005

A Gulf Missile War



Phased Approach to Regional BMD

- **Phase 1: Use existing / maturing systems versus SRBM / MRBM threat**
 - Sea-based missile defenses will be used as necessary to protect parts of southern Europe, combined with other missile defenses (2011 timeframe)
 - Deploys forward-based sensor in Europe
- **Phase 2: Enhanced missile defense systems versus SRBM / MRBM threat**
 - Use advanced sensors and improved version of the SM-3 interceptor, the Block IB, to improve the performance once the technology is proven, including
 - a combination of sea-and land-based configurations (2015 timeframe)
- **Phase 3: Improved area coverage versus MRBM / IRBM threat**
 - As threat matures, use the more capable SM-3 Block IIA interceptor, including
 - a combination of sea-and land-based configurations (2018 timeframe)
- **Phase 4: Capability versus potential ICBM/High Apogee IRBM threat**
 - If potential ICBM threat emerges, advanced missile defense technologies could eventually provide some capability against a regional ICBM threat
 - Once proven and tested, can be made available for deployment to Gulf (2020 timeframe)

Status of US BMD Cooperation with Gulf States

QuickTime™ and a
decompressor
are needed to see this picture.

Key US BMD Initiatives Affecting Gulf States

QuickTime™ and a
decompressor
are needed to see this picture.

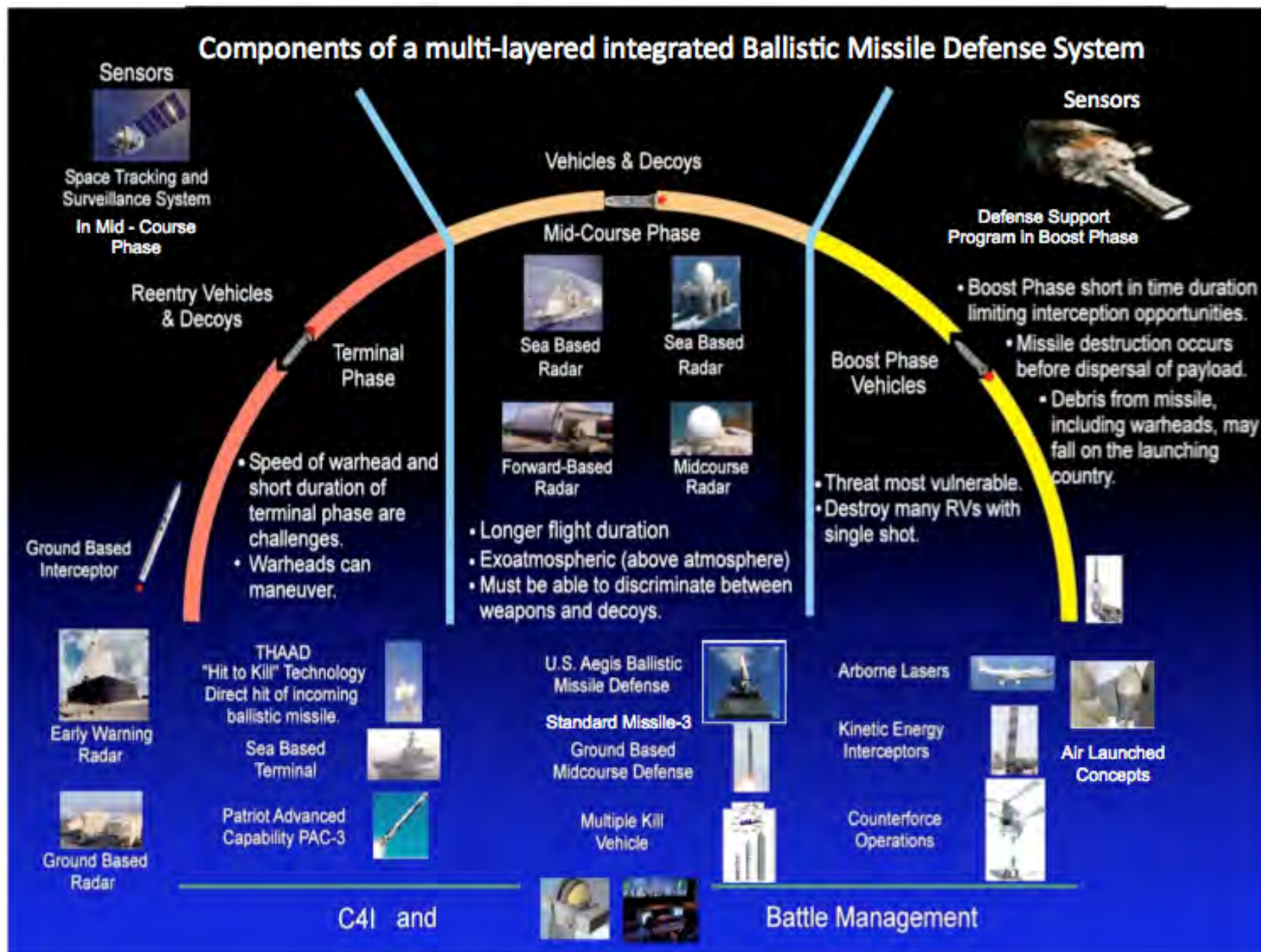
US Layered Missile Defenses

QuickTime™ and a
decompressor
are needed to see this picture.

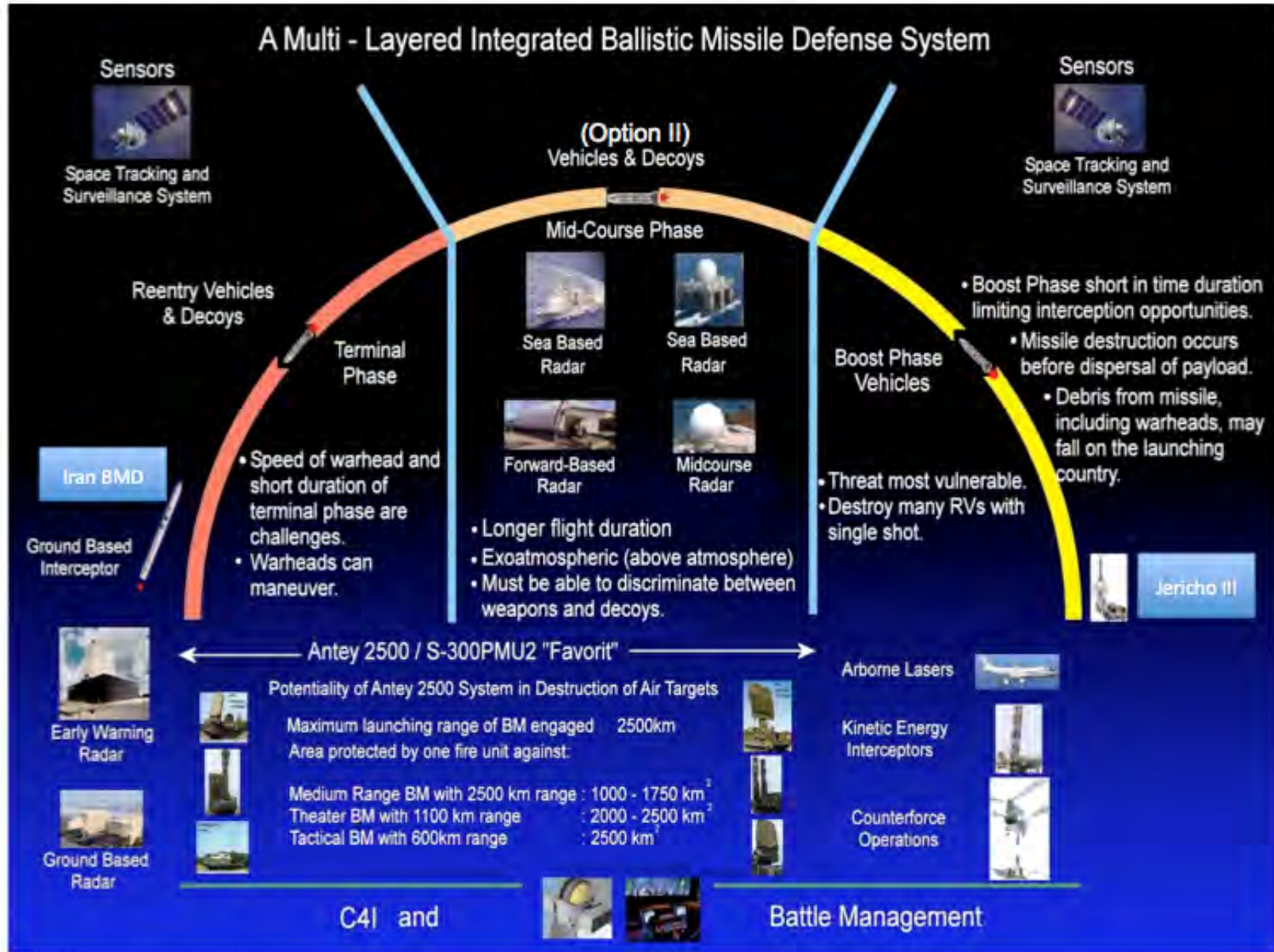
Shifting Intercept Capability: Increasing Early Intercept Capability

QuickTime™ and a
decompressor
are needed to see this picture.

Gulf Integrated Missile Defenses



Iranian Integrated Missile Defenses



The Challenge of Nuclear Forces and Weapons of Mass Destruction

Nuclear Uncertainty

- **Must plan to deal with possible Iranian force with unknown weapons characteristics, delivery systems, basing, and timelines.**
 - **Technology base now exists, enrichment to fissile levels is only limiting factor.**
- **Already a key factor in Iranian capability to conduct “wars of intimidation.”**
- **Clear Iran proceeding with extensive ballistic missile program regardless of whether it pursues the nuclear option.**
- **Cannot predict timeframe for nuclear threat. Worst case is 2009, but could well be 2015.**
 - **Break out, bomb in basement, tested, deployed, serious numbers, mobile, sheltered, LUA/LOW? Fission, boosted, thermonuclear?**
- **Chemical and biological options as well.**

Current & Potential Nuclear Powers

Iran

SRBM < 1000 km	MRBM 1,000 – 3,000 km	IRBM 3,000 – 5,500 km	ICBM > 5,500 km
Shahab-1	Shahab-3	Shahab-5	Shahab-6
Shahab-2	Shahab-4	-	-
Mushak-120	Ghadr-101	-	-
Mushak-160	Ghadr-110	-	-
Mushak-200	IRIS	-	-
-	Sajil	-	-

Syria

SRBM < 1000 km	MRBM 1,000 – 3,000 km	IRBM 3,000 – 5,500 km	ICBM > 5,500 km
SCUD-B	-	-	-
SCUD-C	-	-	-
SCUD-D	-	-	-
SS-21b	-	-	-

Israel

SRBM < 1000 km	MRBM 1,000 – 3,000 km	IRBM 3,000 – 5,500 km	ICBM > 5,500 km
-	Jericho II	-	Jericho II

Pakistan

SRBM < 1000 km	MRBM 1,000 – 3,000 km	IRBM 3,000 – 5,500 km	ICBM > 5,500 km
Shaheen I	Shaheen II	-	-
Hatf I	Ghauri I	-	-
Hatf II	Ghauri II	-	-
Hatf III	Ghauri II	-	-
M-11	-	-	-

India

SRBM < 1000 km	MRBM 1,000 – 3,000 km	IRBM 3,000 – 5,500 km	ICBM > 5,500 km
Agni I	Agni II	Agni III	Surya
Prithvi I			
Prithvi II			



Confusion Over the US NIE

- **Not say Iran was not moving towards nuclear weapon.**
 - **Did say evidence that halted formal efforts at weapons development in 2003. (When US “victories” in Iraq and Afghanistan seemed most threatening to Iran,**
 - **Made it clear that Iran was pursuing enrichment technology that was the sole remaining barrier to Iran acquiring nuclear weapons.**
- **Since NIE was issued, new evidence has surfaced of weapons development efforts beyond initial “laptop” and “Green Salt” disclosures.**
- **Iran has also been discovered to have completed development of a new, far more advanced centrifuge.**
- **Iran has announced two new long-range missiles, and a “space” program that can be adapted to missile development.**

DNI's March 2008 Summary - I

Over the past year we have gained important new insights into **Tehran's** activities related to nuclear weapons and the Community recently published a National Intelligence Estimate on Iranian intent and capabilities in this area. I want to be very clear in addressing the Iranian nuclear capability. First, there are three parts to an effective nuclear weapons capability:

1. Production of fissile material
2. Effective means for weapons delivery
3. Design and weaponization of the warhead itself

We assess in our recent NIE on this subject that warhead design and weaponization were halted, along with covert military uranium conversion- and enrichment-related activities. Declared uranium enrichment efforts, which will enable the production of fissile material, continue. This is the most difficult challenge in nuclear production. Iran's efforts to perfect ballistic missiles that can reach North Africa and Europe also continue.

We remain concerned about Iran's intentions and assess with moderate-to-high confidence that Tehran at a minimum is keeping open the option to develop nuclear weapons. We have high confidence that Iranian military entities were working under government direction to develop nuclear weapons until fall 2003. Also, Iranian entities are continuing to develop a range of technical capabilities that could be applied to producing nuclear weapons. Iran continues its efforts to develop uranium enrichment technology, which can be used both for power reactor fuel and to produce nuclear weapons. And, as noted, Iran continues to deploy ballistic missiles inherently capable of delivering nuclear weapons, and to develop longer-range missiles. We also assess with high confidence that even after fall 2003 Iran has conducted research and development projects with commercial and conventional military applications—some of which would also be of limited use for nuclear weapons.

We judge with high confidence that in fall 2003, Tehran halted its nuclear weapons design and weaponization activities, as well as its covert military uranium conversion and enrichment-related activities, for at least several years. Because of intelligence gaps, DOE and the NIC assess with only moderate confidence that all such activities were halted. We assess with moderate confidence that Tehran had not restarted these activities as of mid-2007, but since they comprised an unannounced secret effort that Iran attempted to hide, we do not know if these activities have been restarted.

We judge with high confidence that the halt was directed primarily in response to increasing international scrutiny and pressure resulting from exposure of Iran's previously undeclared nuclear work. This indicates that Iran may be more susceptible to influence on the issue than we judged previously.

DNI's March 2008 Summary - II

We do not have sufficient intelligence information to judge confidently whether Tehran is willing to maintain the halt of its nuclear weapons design and weaponization activities indefinitely while it weighs its options, or whether it will or already has set specific deadlines or criteria that will prompt it to restart those activities. We assess with high confidence that Iran has the scientific, technical and industrial capacity eventually to produce nuclear weapons. In our judgment, only an Iranian political decision to abandon a nuclear weapons objective would plausibly keep Iran from eventually producing nuclear weapons—and such a decision is inherently reversible. I note again that two activities relevant to a nuclear weapons capability continue: uranium enrichment that will enable the production of fissile material and development of long-range ballistic missile systems.

We assess with moderate confidence that convincing the Iranian leadership to forgo the eventual development of nuclear weapons will be difficult given the linkage many within the leadership see between nuclear weapons development and Iran's key national security and foreign policy objectives, and given Iran's considerable effort from at least the late 1980s to 2003 to develop such weapons.

We continue to assess with moderate-to-high confidence that Iran does not currently have a nuclear weapon. We continue to assess with low confidence that Iran probably has imported at least some weapons-usable fissile material, but still judge with moderate-to-high confidence it has not obtained enough for a nuclear weapon. We cannot rule out that Iran has acquired from abroad—or will acquire in the future—a nuclear weapon or enough fissile material for a weapon. Barring such acquisitions, if Iran wants to have nuclear weapons it would need to produce sufficient amounts of fissile material indigenously—which we judge with high confidence it has not yet done.

Iran resumed its declared centrifuge enrichment activities in January 2006, despite the 2003 halt in its nuclear weapons design and weaponization activities. Iran made significant progress in 2007 installing centrifuges at Natanz, but we judge with moderate confidence it still faces significant technical problems operating them.

•We judge with moderate confidence that the earliest possible date Iran would be technically capable of producing enough highly enriched uranium (HEU) for a weapon is late 2009, but that is very unlikely.

•We judge with moderate confidence Iran probably would be technically capable of producing enough HEU for a weapon sometime during the 2010-2015 time frame. INR judges Iran is unlikely to achieve this capability before 2013 because of foreseeable technical and programmatic problems. All agencies recognize the possibility that this capability may not be attained until *after* 2015.

DNI's March 2008 Summary - III

We know that Tehran had a chemical warfare program prior to 1997, when it declared elements of its program. We assess that Tehran maintains dual-use facilities intended to produce CW agent in times of need and conducts research that may have offensive applications. We assess Iran maintains a capability to weaponize CW agents in a variety of delivery systems.

We assess that Iran has previously conducted offensive BW agent research and development. Iran continues to seek dual- use technologies that could be used for biological warfare.

Extract from J. Michael McConnell, Director of National Intelligence, "Annual Threat Assessment of the Intelligence Community for the Senate Armed Services Committee," 27 February 2008

ISIS Report: Misconceptions about Iran's Nuclear Program - I

1. Iran's IAEA safeguards violations were minor breaches and fully in the past

- Iran's violation of its obligations under the verification requirements of the Nuclear NPT is one of most significant breaches of this treaty.
- Iran's safeguards violations have been detailed in numerous IAEA reports starting in 2003
- November 2003: Iran has failed in a number of instances over an extended period of time to meet its obligations under its Safeguards Agreement with respect to the reporting of nuclear material and its processing and use, as well as the declaration of facilities where such material has been processed and stored....”
- Iran's development of its enrichment capability took place over 18 years and in secrecy. This places Iran's actions outside the category of “minor.”
- As a consequence of Iran's safeguards violations, the United Nations Security Council has passed five resolutions, four of them containing sanctions, calling on Iran to halt uranium enrichment, accept the Additional Protocol, and comply with IAEA requests to clarify key past activities concerning the military dimensions of its program, including the role of military organizations in the centrifuge program and a set of records, referred to as the “laptop documents” which we discuss further in this document.”
- The November 2004 IAEA report enumerates Iran's safeguards violations and notes that Iran's cooperation up to October 2003 was marked by “extensive concealment, misleading information and delays in access to nuclear material and facilities,” include its imports of nuclear material, falsehoods about the origin of centrifuge technology and equipment, and its enrichment activities.

ISIS Report: Misconceptions about Iran's Nuclear Program - II

2. All of Iran's nuclear facilities are under safeguards or monitoring, or alternatively the IAEA has found no evidence that Iran has any secret nuclear facilities

- Many key nuclear activities and facilities are not under any type of IAEA monitoring.
- This lack of Iranian transparency poses one of the most difficult challenges to determining whether Iran has undeclared nuclear activities and materials and is conducting nuclear weapons work.
- The IAEA safeguards system in Iran is currently limited to traditional safeguards under an INFCIRC/153 agreement, which is part of Iran's obligations under the Nuclear NPT.
 - Agreement applies to all of Iran's sources of special fissionable material for the exclusive purpose of verifying that such material is not diverted to nuclear weapons or other nuclear explosive devices.
 - Iran agreed to allow this agreement in 2003, then decided to no longer do so in 2006.
- The IAEA has reported that it is unable to determine if Iran has undeclared nuclear materials or activities.
- In the past, the IAEA has found evidence of secret nuclear sites.
- Now, the IAEA is limited in its ability to look for any such sites because of the weakened inspections and Iran's interpretation of its obligations to the IAEA under INFCIRC/153.
- The IAEA maintains safeguards at the Bushehr nuclear reactor, several facilities at Esfahan (including uranium conversion and fuel fabrication facilities), the Natanz fuel enrichment plants, the Tehran Research Reactor, a facility for radioactive waste storage facility and a laboratory.

ISIS Report: Misconceptions about Iran's Nuclear Program - III

3. Iran is fully in compliance with its safeguards obligations

- Iran has refused multiple IAEA requests to verify design information for the Arak heavy water reactor and its associated facilities currently under construction. The IAEA has stated that this refusal is inconsistent with its obligations under INFCIRC/153.
- The IAEA also takes issue with Iran's decision to stop providing information about new nuclear facilities when it makes a decision to construct them.
 - Iran is insisting on adhering to a long outdated version of its safeguards undertakings by agreeing to provide such information only 180 days before the introduction of nuclear material into the facility.
 - Iran initially agreed to provide early notification in 2003, but subsequently reversed its decision. The IAEA states that such a unilateral decision is inconsistent with Iran's obligations under INFCIRC/153.
 - Iran has built secret nuclear sites, including the Natanz gas centrifuge complex, exploiting this outdated arrangement. Iran confirmed its existence in early 2003 only after it was exposed publicly by groups such as ISIS.
 - Gaining assurance that no such sites are under construction now is critical to ensuring that Iran is not trying to exploit this dispute to build nuclear facilities in secret.

ISIS Report: Misconceptions about Iran's Nuclear Program - IV

4. Producing HEU from LEU is a long and arduous process, and nuclear weapons breakout will take between one and three years

- Learning to produce enriched uranium by operating centrifuges in large numbers is the difficult part on the road to developing a viable gas centrifuge capability.
- Enriching low enriched uranium (LEU) to highly enriched uranium (HEU) is relatively straightforward and can be done quickly, in some cases within months.
 - This process of enriching a stock of LEU to weapon-grade is called a nuclear weapons “break-out” capability.
- Iran’s centrifuge program has advanced considerably in the last year.
 - Iran has succeeded in manufacturing and installing large numbers of centrifuges and ramping up its production of LEU.
 - As of the end of May 2009, Iran had over 7,000 centrifuges enriching uranium or under vacuum and ready to enrich, and had produced over 1,300 kilograms of low enriched uranium hexafluoride.
- The ISIS concludes in its reporting that Iran has not made the political decision to develop a nuclear weapon, but that should its leadership so decide, Iran would have viable options for producing enough weapon-grade uranium for a nuclear weapon within six months or less.

ISIS Report: Misconceptions about Iran's Nuclear Program - V

5. Iran does not currently have a nuclear weapons capability

- Iran's gas centrifuge program is currently large enough to provide Iran several ways to produce weapon-grade uranium.
- The time needed to produce enough weapon-grade uranium for a nuclear weapon is measured in months or a few years at most.
- Iran currently operates enough centrifuges at the Natanz Fuel Enrichment Plant to produce weapon-grade uranium directly from natural uranium,
 - If it decided to do so it would need to adjust the cascades or install a relatively small number of new cascades specifically for that purpose.
- As an alternative to modifying the Natanz facility, Iran is capable of building a clandestine plant to make weapon-grade uranium from natural uranium. It has established at Natanz that it can build, install and operate large numbers of cascades. Given the risk of military strikes against Natanz if Iran were making weapon-grade there, it might prefer to build a parallel, secret plant.
- Iran would also need a supply of uranium hexafluoride for such a facility;
 - all of the uranium hexafluoride produced by Esfahan is under safeguards, so it would also likely need to construct a secret parallel facility to make uranium hexafluoride or acquire it illicitly from an overseas supplier.
- Given Iran's refusal to accept any but the weakest safeguards, the IAEA is unable to provide assurances about the absence of any undeclared nuclear materials or facilities. It has no access to centrifuge manufacturing workshops, making it difficult to know how many centrifuges are being produced and where they are stored. Adding in a long history of clandestine nuclear activities, the possibility of Iran building a secret gas centrifuge plant cannot be ruled-out.

ISIS Report: Misconceptions about Iran's Nuclear Program – VI

6. Iran would have to conduct a full-scale nuclear test in order to build a nuclear weapon

- Developing an implosion-type nuclear weapon can be done without needing a full-scale test.
- Most states pursuing a clandestine nuclear weapons program have sought to avoid the need for full-scale testing.
 - If a test is conducted, as it was by Pakistan and North Korea, it served to further refine nuclear weapons skills and more importantly demonstrate dramatically a strategic and political point.
- States have used different options to avoid the need for tests.
 - Pakistan did so after receiving a tested warhead design from China in the early 1980s.
 - To develop confidence in its implosion design, prior to the Gulf War, Iraq was developing a set of tests of components and of the entire device with a surrogate material substituting for HEU.
 - South Africa was likewise planning to pursue this approach for an implosion weapon. Iran would likely follow a path to maximize its flexibility and minimize its requirements for HEU.

ISIS Report: Misconceptions about Iran's Nuclear Program – VII

6. The “laptop documents” are forgeries

- The story of the laptop documents was broken in 2005 and 2006 by Carla Anne Robbins, then at the Wall Street Journal, and Dafna Linzer, at the time writing for the Washington Post.
- The February 27, 2006 IAEA report notes that on December 5, 2005 the IAEA “repeated its request for a meeting to discuss information that had been made available to the Secretariat about alleged studies, including what is known as the Green Salt Project, concerning the conversion of uranium dioxide into uranium tetrafluoride (often referred to as “green salt”), tests related to high explosives, and the design of a missile re-entry vehicle.”
 - Iran agreed to the meeting in January and officials met February 26, 2006. Iranian officials responded that the allegations were “based on false and fabricated documents so they were baseless,” and that neither such a project nor such studies exist or did exist.”
 - Later, Iran said that some of the documents were authentic but had nothing to do with nuclear weapons.
- IAEA analysts who reviewed the documents assessed that the volume of material, level of detail, including names, places and entities, do not support the conclusion that the documents are forgeries.
- The IAEA has continued to pursue the matter with Iran. Its May 2008 report contains an annotated listing of thirteen documents related to the laptop or “alleged studies.”
- Iran has repeatedly refused IAEA requests to meet with individuals named in the documents, in particular Dr. Mohsen Fakhrizadeh, who appears to be at the center of the alleged nuclear weaponization-related research and development.

300 miles
500 km

TURKEY

TURKMENISTAN

CASPIAN SEA

Lashkar A'bad

Sites circled in red
unknown pre-mid 2002

Tehran

IRAQ

Arak

Natanz

Isfahan

IRAN

Saghand

Ardekan

AFGHANISTAN

MW Megawatts

Uranium processing facility

Uranium mines

Heavy-water facility

Research reactors / research facilities

Uranium enrichment facility

Light-water reactor (under construction)

KUWAIT

Bushehr

1000 MW

SAUDI ARABIA

BAHRAIN

QATAR

Gachin

PAKISTAN

The Gulf

Gulf of Oman

MIDDLE EAST

Vehicle Entrance Ramp
(before burial)

Bunkered underground
production halls

Admin/engineering
office area

DigitalGlobe Quickbird commercial satellite image

20 SEP 02

Vehicle Entrance Ramp
(after burial)

Bunkered underground
Centrifuge cascade halls

Helicopter
pads

New security
wall

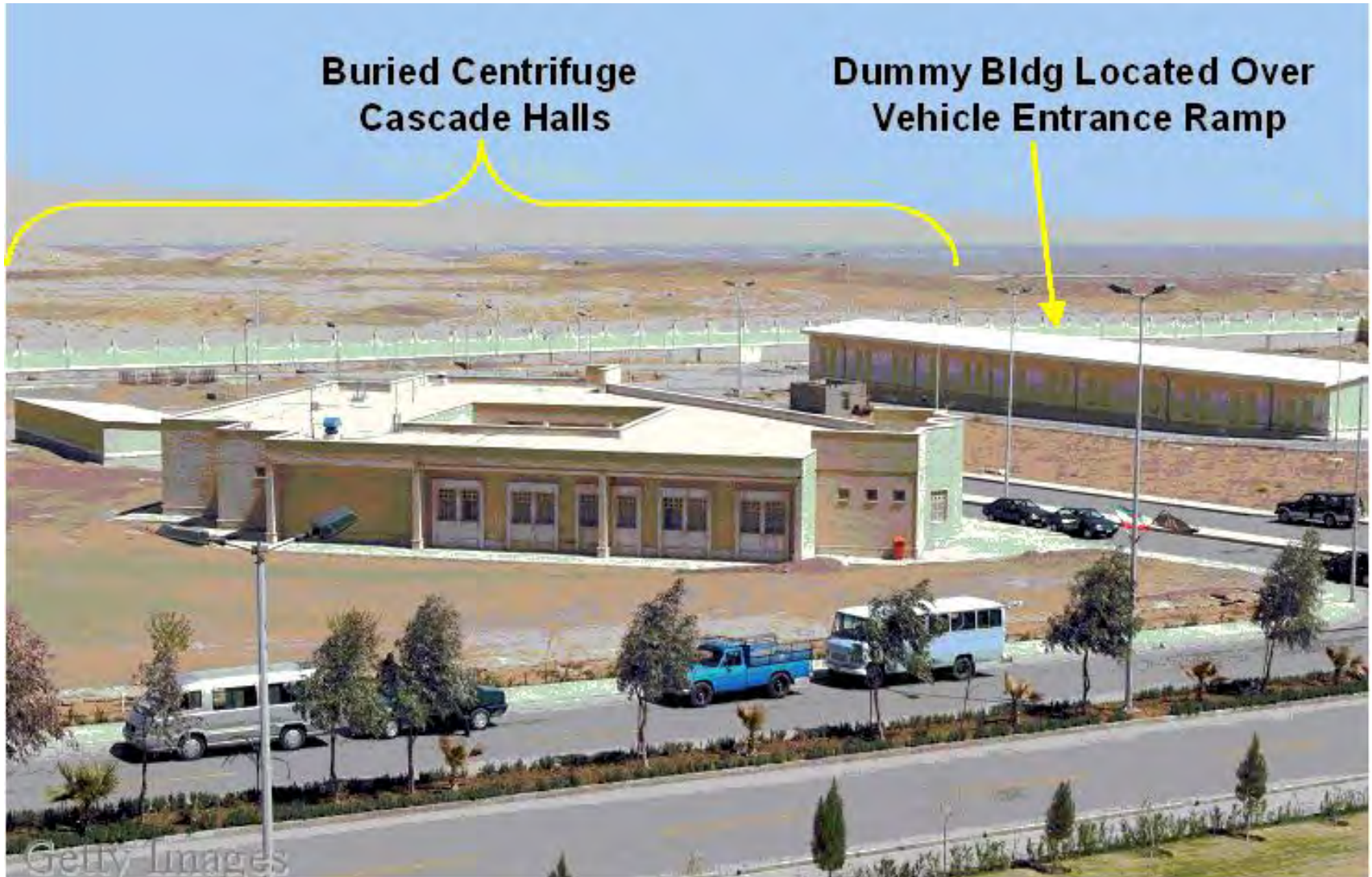
Dummy building
concealing tunnel
entrance ramp

Admin/engineering
office area

DigitalGlobe Quickbird commercial satellite image

21 JUL 04

Effective Concealment



How Much is Enough?

Amount of Fissile Material Need to Build a Basic Fission (Non-Boosted) Weapon

Highly Enriched Uranium

HEU (90% U-235)

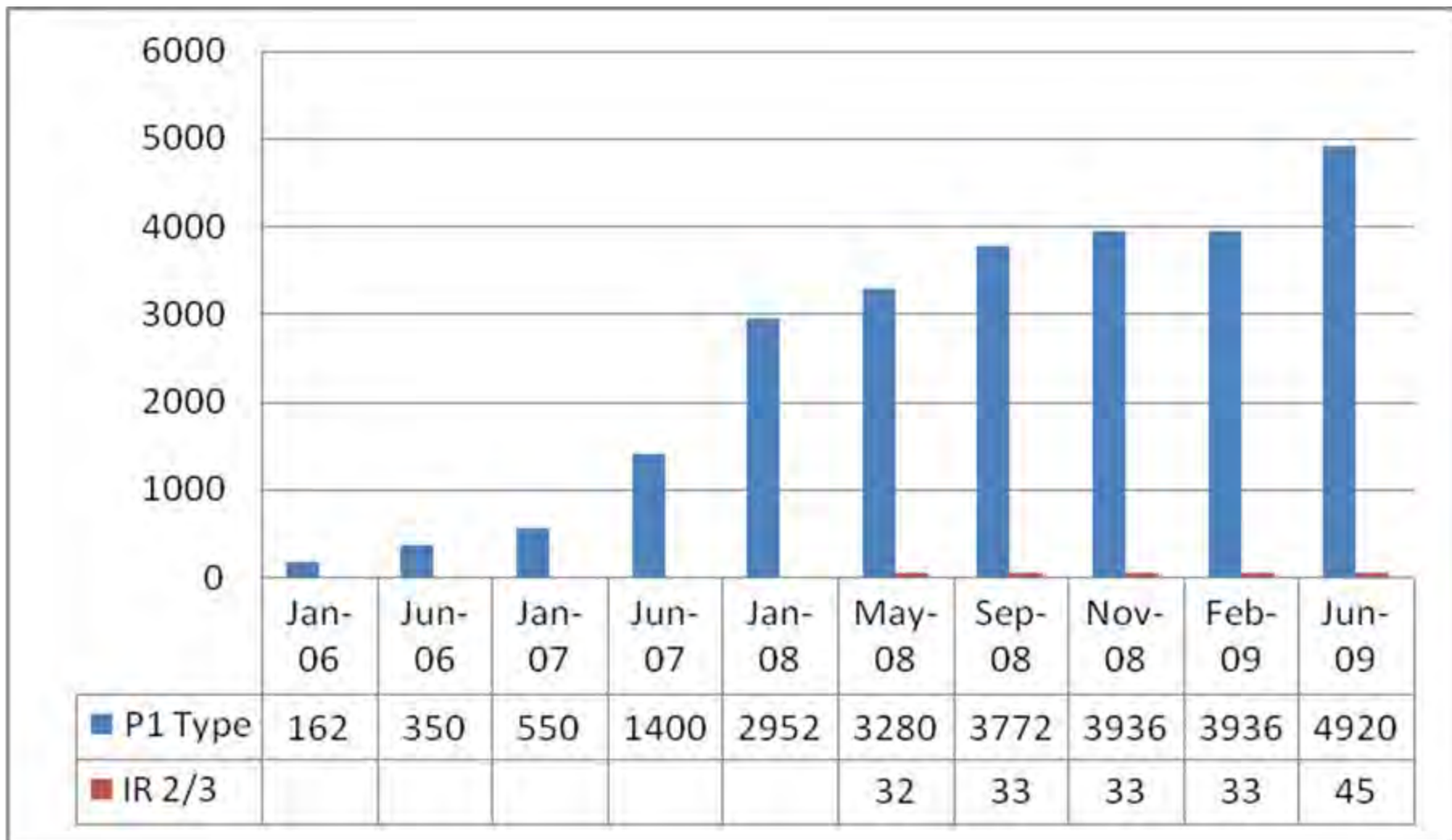
Simple gun-type weapon	90-110 lbs/40-50 kg
Simple implosion weapon	33lbs/15 kg
Sophisticated implosion weapon	20-26lbs/9-12kg

Weapons Grade Plutonium

Simple implosion weapon	14lbs/6 kg
Sophisticated implosion weapon	4.5-9lbs/2-4 kg

Extract from the unclassified estimates in Union of Concerned Scientists, "Preventing Nuclear Terrorism Fact Sheet," April 2004, and work by Abdullah Toucan

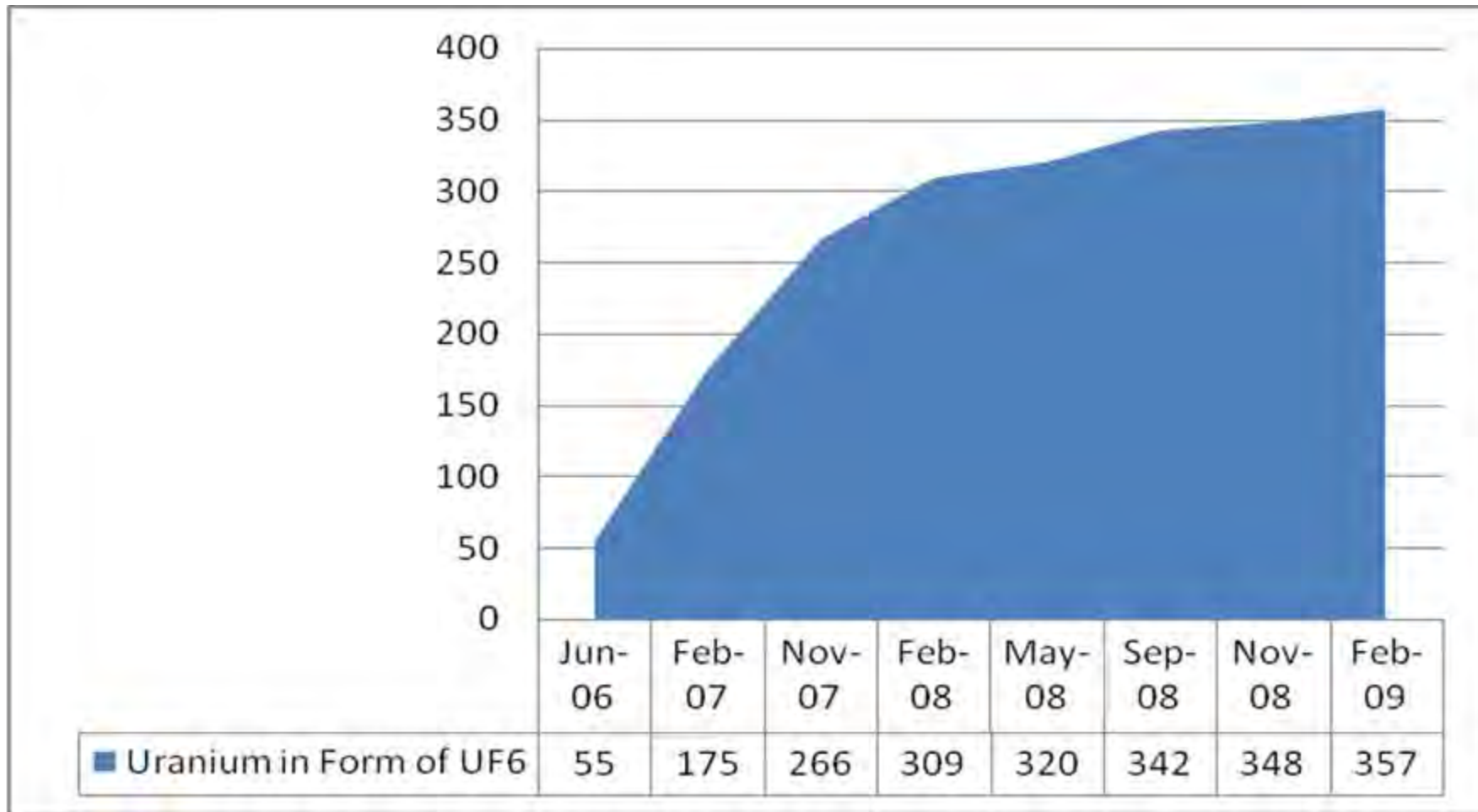
Number of Centrifuges Enriching Uranium at Natanz FEP



Source: Adapted by Adam C. Seitz from various IAEA reports, ISIS analysis, and University of Wisconsin Project on Nuclear Arms Control.

Cumulative UF6 Production at Esfahan

(in metric tonnes of uranium mass)



Source: Adapted by Adam C. Seitz from various IAEA reports, ISIS analysis, and University of Wisconsin Project on Nuclear Arms Control.

Iran's Hypothetical Forces

- **Less than 50 nuclear weapons, most fission, possibly some boosted. 30 Nuclear warheads, 20 bombs.**
 - **Most 20-30 Kt, some 100 KT**
- **100 Shahab 3 and 3 ER on mobile TELs. 60 TELs.**
- **Su-24, F-14 convert, and Su-37 strike aircraft.**
- **Reverse engineered KH-55 cruise missiles.**
- **Mustard and persistent nerve gas, stable bombs, bombs and warheads with cluster munitions.**
- **Limited satellite targeting and damage assessment capability.**
- **Limited ballistic missile point defense capability with SA-300/SA-400**
- **Meaningful civil defense? No.**

Israel's Hypothetical Forces

- **200+ boosted and fusion weapons.**
 - **Most 20-100 Kt variable yield, some 1 Megaton.**
- **100 Jericho 1 and 2.**
- **30 Jericho ER.**
- **JSF, F15I, F-16I with nuclear-armed cruise missiles, advanced conventional precision strike capability.**
- **3 Dolphin submarines with nuclear armed SLCMs.**
- **High resolution satellite targeting and damage assessment capability.**
- **Moderate ballistic missile point and area defense capability with Arrow IV/V and Patriot PAC-3 TMD.**
- **CW? Assume Yes. BW? Assume No.**
- **Meaningful civil defense? CW only.**

Strike on Iran?

- **Timelines: Acquisition? Deployment? Modernization?**
- **Targeting intelligence?**
- **Dispersal, hardening, concealment?**
- **Hardening vs. Attack Lethality**
- **SEAD: Penetration? Suppression? Kill?**
- **Range-payload, refuel, recovery**
- **Restrike? Penetration corridor enforcement?**
- **LOW? LUA? Covert?**

Post-Strike on Iran/ Parallel Iranian Options

- **IR-2, IR-3, IR-3 “cooled,” IR-4**
- **Folded centrifuge**
- **Concealed heavy water reactor**
- **LWR cannibalization**
- **LWR download**
- **Dirty weapons**
- **Basic biological**
- **Genetic engineered weapons**

Key Force Posture Decisions

- **US and/or Israel**
 - **Prevent, preempt, contain, deter, retaliate, mutual assured destruction.**
- **Iran and Israel:**
 - **In reserve (secure storage), launch on warning (LOW), launch under attack (LOA), ride out and retaliate**
 - **Continuous alert, dispersal**
 - **Point, wide area defense goals**
- **Israel:**
 - **Basing mode: sea basing, sheltered missiles.**
 - **Limited strike, existential national, multinational survivable.**
- **US:**
 - **Level of defensive aid.**
 - **Ambiguous response**
 - **Clear deployment of nuclear response capability.**
 - **Extended deterrence. Assured retaliation.**
- **Gulf:**
 - **Passive (wait out), defensive, or go nuclear.**
 - **Ballistic, cruise missile, air defense.**
 - **Seek extended deterrence from US**

Key Force Posture Decisions - II

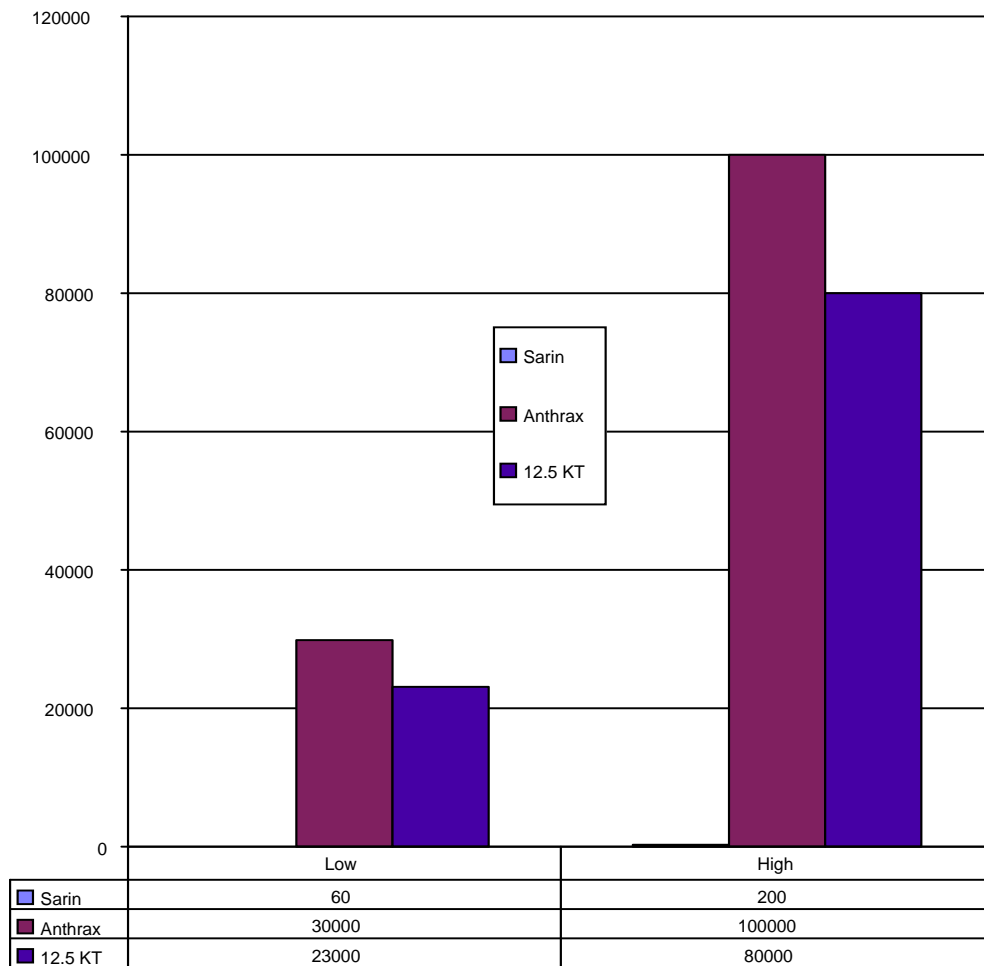
- **Syria:**
 - **Link or decouple from Iran.**
 - **Passive (tacit threat) or active (clear, combat ready deployment).**
- **Non-State Actor:**
 - **Tacit or covert capability.**
 - **Proven capability.**
 - **Deployment mode: Hidden, dispersed, pre-emplaced**

Iran Nuclear, US Conventional

- Assume mature, dispersed Iranian force. Preemption limited option for US, but face launch on warning, launch under attack option.
- Iran cannot threaten US. Can threaten US bases in Gulf, Israel, Europe, GCC allies, Egypt, Jordan, oil export capabilities.
- SAD-like environment relying on proxy targets for maximum damage to US.
- Iranian side:
 - Limited strike designed to intimidate or show resolve, force issue without generating massive nuclear retaliation. Might focus on Arab target, rather than US or Israel, to try to limit retaliation.
 - *Reserve strike capability critical.*
 - *Lower fission yields, less accurate force* limit range of targeting, but can cover all US bases and mix of other targets.
 - Target to maximize casualties, clear attention to fall out, lasting effects.
 - Inflict 2,000,000 to 8,000,000 prompt to 21-day dead; long term death rate cannot be calculated.
 - Iranian recovery very possible.
- US side:
 - Some preemptive damage limitation possible.
 - Launch on confirmed warning from US satellites.
 - Massive reserve conventional and nuclear strike capability.
 - Stealth and precision strike capability give weapons of mass effectiveness (WME) capability.
 - Power, refineries, continuity of government, C4I assets.
 - EMP option would be “semi-nuclear” response.

CBRN Prompt (48-hour) Killing Effect in an Urban Environment

The Relative Killing Effect of Chemical vs. Biological vs. Nuclear Weapons



Source: Adapted by Anthony H. Cordesman from Victor A. Utgoff, *The Challenge of Chemical Weapons*, New York, St. Martin's, 1991, pp. 238-242 and Office of Technology Assessment, *Proliferation of Weapons of Mass Destruction: Assessing the Risks*, U.S. Congress OTA-ISC-559, Washington, August, 1993, pp. 56-57.

Q₅₀ for Some Types of BW - Open-Air Deployment

- **Plague (liquid): 3.5-4.5 liter/sq.km**
- **Tularemia (dry): 3.0-4.0 kg/sq.km**
- **Anthrax (dry, old version): 15-20 kg/sq.km**
- **Anthrax (dry, new version): 4.5-5.0 kg/sq.km**
- **Anthrax (liquid): 5.0-5.5 liter/sq.km**
- **Brucellosis (dry): 3.5-4.5 kg/sq.km**
- **Glanders/Melioidosis (liquid): 4.5-5.5 liter/sq.km**
- **Smallpox (liquid): 3.5-4.0 liter/sq.km**
- **Marburg (dry): less than 1.0 kg/sq.km**

New Types of Biological Weapons

- *Binary biological weapons* that use two safe to handle elements that can be assembled before use. This could be a virus and helper virus like Hepatitis D or a bacterial virulence plasmid like E. coli, plague, Anthrax, and dysentery.
- *Designer genes and life forms*, which could include synthetic genes and gene networks, synthetic viruses, and synthetic organisms. These weapons include DNA shuffling, synthetic forms of the flu – which killed more people in 1918 than died in all of World War I and which still kills about 30,000 Americans a year – and synthetic microorganisms.
- *"Gene therapy" weapons* that use transforming viruses or similar DNA vectors carrying Trojan horse genes (retrovirus, adenovirus, poxvirus, HSV-1). Such weapons can produce single individual (somatic cell) or inheritable (germline) changes. It can also remove immunities and wound healing capabilities.
- *Stealth viruses* can be transforming or conditionally inducible. They exploit the fact that humans normally carry a substantial viral load, and examples are the herpes virus, cytomegalovirus, Epstein-Barr, and SV40 contamination which are normally dormant or limited in infect but can be transformed into far more lethal diseases. They can be introduced over years and then used to blackmail a population.
- *Host-swapping diseases*: Viral parasites normally have narrow host ranges and develop an evolutionary equilibrium with their hosts. Disruption of this equilibrium normally produces no results, but it can be extremely lethal. Natural examples include AIDS, Hantavirus, Marburg, and Ebola. Tailoring the disruption for attack purposes can produce weapons that are extremely lethal and for which there is no treatment. A tailored disease like AIDS could combine serious initial lethality with crippling long-term effects lasting decades.
- *Designer diseases* involve using molecular biology to create the disease first and then constructing a pathogen to produce it. It could eliminate immunity, target normally dormant genes, or instruct cells to commit suicide. Apoptosis is programmed cell death, and specific apoptosis can be used to kill any mix of cells.

Soviet RBK-type Cluster Bomb for CBR Weapons



Non-State Actor CBR(N?)

- **Independent, Proxy, False Flag, or Trigger Force?**
- **Access likely to be more critical in determining capability than ability to create own weapons, but highly lethal BW and genetic weapons may be becoming “off the shelf” option.**
- **Many of same twists as covert State Actor attacks:**
 - **Bypasses defenses.**
 - **Plausible deniability?**
 - **Exploits special vulnerability of “one bomb” states.**
 - **Psychological and political impacts as important as direct killing effects.**
 - **False flag and proxy options clear.**
 - **Buying time may limit risk of retaliation.**
 - **Allows to exploit “slow kill” nature of biological strikes. Achieve “line source” effects**
 - **Covert forces in place can restrike or escalate.**
- **Unclear Non-State Actors are deterrable by any form of retaliation.**

State Actor Covert Bioterrorism, Suitcase Nuclear

- **Bypasses defenses.**
- **Plausible deniability?**
- **Exploits special vulnerability of “one bomb” states.**
- **Psychological and political impacts as important as direct killing effects.**
- **False flag and proxy options clear.**
- **Buying time may limit risk of retaliation.**
- **Allows to exploit “slow kill” nature of biological strikes. Achieve “line source” effects**
- **Covert forces in place can restrike or escalate.**
- **Target potentially faces major weakening of conventional capabilities without ability to counter-escalate.**

Possible Terrorist/Covert/Irregular Deployment of Biological Weapons

- **Use of infected vectors (mosquitoes, fleas, lice, etc.)**
- **Contamination of food and water supplies**
- **Contamination of various articles (letters, books, surfaces, etc.)**
- **Use of different aerosolizing devices and approaches to contaminate inner spaces of various buildings (line and point sources)**
- **Use of different aerosolizing devices and approaches for open-air dissemination (line and point sources)**
- **Inner- and outer-space explosive dissemination including suicide bombers**
- **Terrorist/Sabotage methods of infecting crops and livestock**

WME: “Weapons of Mass Effectiveness”

- **Theoretical possibility, give precision long-range strike capability.**
- **Target mix varies with attacker’s motives.**
- **Broad possible target base in MENA area, varying sharply by country.**
 - **Desalination**
 - **Major power plants, nuclear power plants.**
 - **Water purification and distribution.**
 - **Refinery**
 - **High value, long-lead time oil, gas, and petrochemical facilities.**
 - **Ethnic and sectarian high value targets.**
 - **Leadership elite: Royal family, president, etc.**

Dealing with Nuclear Uncertainty

- **Decide proper mix of four basic military options:**
 - **Prevention/preemption,**
 - **Active and passive defense,**
 - **Acquiring own nuclear weapons, and/or**
 - **US extended deterrence.**
- **Can wait for diplomacy for time being, but need to start considering future options.**
 - **Ballistic and cruise missile defenses maybe cost-effective simply to deal with conventional threat.**
 - **A number of systems offer both improved air and missile defense.**
 - **Need quiet talks with US on containment options; extended deterrence.**
 - **Open support for IAEA and diplomatic options key passive approach.**