

LESSONS LEARNED FROM THE IRAQ WAR

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International Corporation*

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## LESSONS LEARNED FROM THE AIR WAR WITH IRAQ

### OBJECTIVES

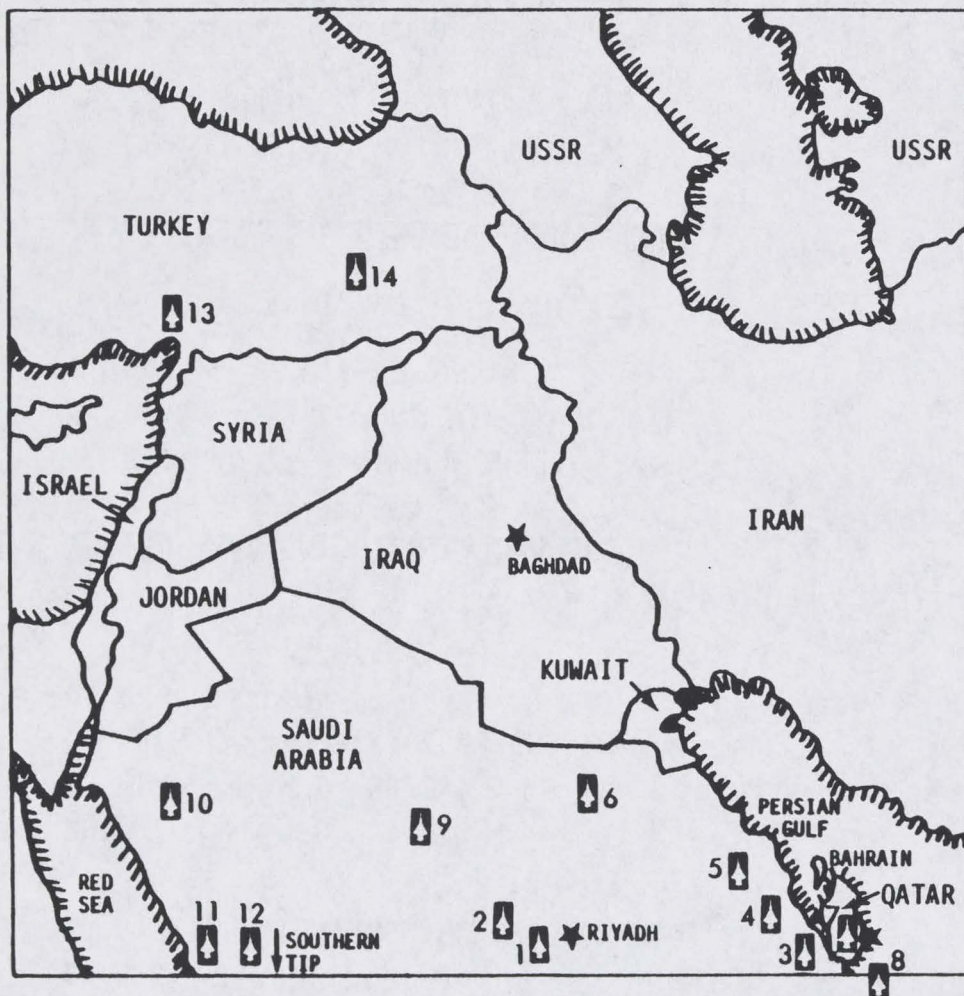
- SUMMARIZE THE AIR WAR (16 JANUARY TO 27 FEBRUARY 1991)
  - STRATEGIC, TACTICAL, RECONNAISSANCE, AND OTHER MISSIONS
  - STATISTICS, TRENDS, AND CHANGES IN MISSIONS VS TIME
  - EFFECTIVENESS AND PROBLEMS ENCOUNTERED
- IDENTIFY THE CONTRIBUTIONS OF STEALTH AIRCRAFT, HIGH TECHNOLOGY WEAPONS, AND OPERATIONAL PROCEDURES THAT HELPED OR HINDERED THE U.S. AND ALLIED CAMPAIGN
  - LEVERAGE FOR FUTURE B-2 APPLICATIONS
  - REQUIREMENTS FOR NEW WEAPONS OR TACTICS

### SOURCES

- NO CLASSIFIED DATA HAS YET BEEN RELEASED
  - STUDY DOES NOT REFLECT OFFICIAL USAF OR INTELLIGENCE CONCLUSIONS OR POSITIONS
  - OBSERVATIONS BASED ON DoD AND FOREIGN PRESS RELEASES
- UNCLASSIFIED SOURCES
  - MAGAZINES: USN&WR, TIME, NEWSWEEK, AW&ST
  - NEWSPAPERS: NY TIMES, WALL STREET JOURNAL, SAN DIEGO UNION, LA TIMES, OCEANSIDE BLADE TRIBUNE, DEFENSE NEWS
  - FOREIGN: JANE'S DEFENCE WEEKLY



## U.S. AND ALLIED AIR-ORDER-OF-BATTLE: MID-JANUARY 1991 - I



### 4. HUFFUF ROYAL SAUDI AFB (FRENCH)

- 12 MIRAGE 2000s<sup>4,9</sup>    ● 4 MIRAGE F1-CRs<sup>4,9</sup>
- 27 JAGUARS<sup>1,4</sup>

### 5. AL JABAYL ROYAL SAUDI AFB (USAF)

- 72 A-10s<sup>1</sup>

- TOTAL COMBAT AIRCRAFT: >2000<sup>110</sup> TO 2600<sup>1</sup>
  - U.S. LAND-BASED/FIXED WING: 1300
  - U.S. SEA-BASED/FIXED WING: 500
  - ALLIED LAND-BASED/FIXED WING: 640
- TOTAL COMBAT HELICOPTERS: 1959<sup>6</sup>
- TOMAHAWK CRUISE MISSILES: ~500

### 1. RIYADH (SOUTH)

- SAUDI ARABIAN AF
  - 36 BAC-167s<sup>1,5</sup>
  - 5 AWACS<sup>1,2</sup> (E-3A)<sup>5</sup>
- USAF
  - 5 AWACS<sup>1,2</sup>
  - KC-10s & KC-135s<sup>1</sup>
  - AIR TRANSPORT HOSPITALS<sup>1</sup>

### 2. RIYADH (WEST)

- SAUDI ARABIAN AIR FORCE ACADEMY
  - 30 HAWK<sup>5</sup>

### 3. DHAHRAN ROYAL SAUDI AFB

- SAUDI ARABIAN AF
  - 36 F-15C/Ds<sup>1</sup>
  - 24 TORNADO F-3s<sup>1</sup>
  - 30 TORNADO GRIs<sup>1</sup>
- BRITAIN
  - 24 TORNADO ADVs<sup>1</sup>
  - 18 TORNADO F-3s<sup>1</sup>
- USAF
  - 96 F-15C/Ds<sup>1</sup>



U.S. AND ALLIED AIR-ORDER-OF-BATTLE: MID-JANUARY 1991 - II

6. HAFAR AL BATIN

- U.S. SPECIAL FORCES
- U.S. 101st AIRBORNE DIVISION HDQ. AND HELICOPTERS

7. DOHA, QATAR AFB

- USAF -- 72 F-16C/Ds<sup>1</sup>
- FRANCE -- 8 MIRAGE F1-CRs<sup>1,9</sup>
- CANADA -- 24 CF-18s
- QATAR -- 13 MIRAGE F1s<sup>1</sup>  
-- 6 ALPHA JETS<sup>5</sup>

8. UNITED ARAB EMIRATES IN SHARJAH AFB

- USAF -- 24 F-15Es<sup>1</sup>
- BRITAIN -- 3 NIMROD MR-2s<sup>1</sup>
- OMAN -- 63 COMBAT AC<sup>1,5</sup>
- UAE -- 12 MIRAGE 2000<sup>5</sup>  
-- 3 MIRAGE 5 RAD<sup>5</sup>  
-- 26 MIRAGE III & HAWKS<sup>5</sup>

9. NEW BASE CONSTRUCTED FOR WAR (USAF)

- 24 F-15Es<sup>1</sup>
- 24 F-16s<sup>1</sup>
- 24 F-15C/Ds<sup>1</sup>
- 24 OTHERS<sup>1</sup>
- 24 F/A-18s<sup>1</sup>

10. TABUK ROYAL SAUDI AFB

- SAUDI ARABIAN AF -- 25 F-5Es<sup>1</sup>
- BRITAIN -- 18 TORNADO GRIs<sup>1</sup>

11. TAIF ROYAL SAUDI AFB

- 20 F-15C/Ds
- 40 F-5Es<sup>1</sup>

12. KHAMIS-MUSHAYAT ROYAL SAUDI AFB

- 15 F-15Es
- 25 F-5Es<sup>1</sup>

13. INCIRLIK, TURKEY U.S. NATO AFB

- 24 F-111Es, 56 F-111Fs, AND 14 FB-111s<sup>1</sup>
- 24 F-16s<sup>1</sup> AND 24 F-15s<sup>1</sup>
- 3 AWACs

14. DIYARBAKER, TURKEY ALLIED NATO AFB

- GERMANY -- 18 ALPHA JETS
- BELGIUM -- 18 MIRAGE 5s
- ITALY -- 8 F-104s<sup>2</sup>

15. UNSPECIFIED LOCATIONS IN SAUDI ARABIA

- 6 TR-1 RECONNAISSANCE<sup>2</sup>
- 35-56 F-117A STEALTH<sup>2</sup>
- 62 F-111Fs<sup>1</sup>
- 48 A-10s<sup>1</sup>
- 36 F-4G WILD WEASELS<sup>1</sup>
- 26 B-52s (ENGLAND) PLUS 22 (DIEGO GARCIA) REFUEL AND SUPPORT
- 140 C-130 GUN SHIPS/TRANSPORTS
- 2 E-8 JSTARS C<sup>3</sup>

16. KUWAIT AF IN EXILE (AT SAUDI AFBs)

- 16 MIRAGE F-1s<sup>3</sup>
- 20 A-4s<sup>3</sup>
- 6 HAWKS<sup>3</sup>



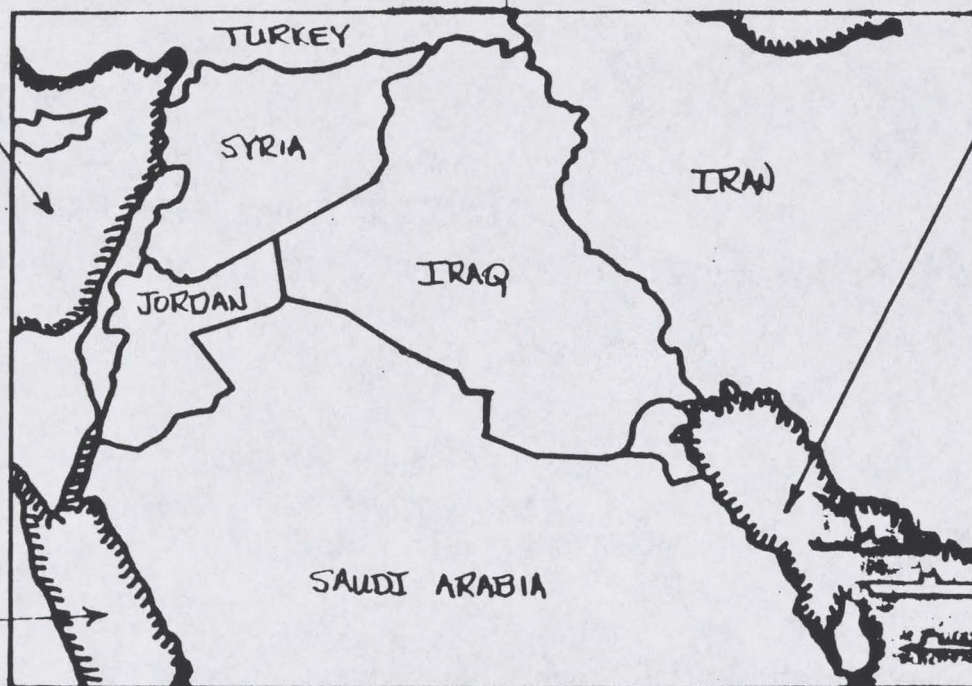
# US AND ALLIED NAVAL AIR-ORDER-OF-BATTLE: MID-JANUARY 1991

## MEDITERRANEAN

Assault Carriers(?),  
 • 44 AV-8B Harriers  
 • ~40 helicopters

## RED SEA

Carriers (4) USS  
 Saratoga, John  
 F. Kennedy, America,  
 & Theo. Roosevelt  
 ✓ • 68 F-14s (114<sup>2</sup>-46<sup>1</sup>)  
 ✓ • 68 F/A-18s (128<sup>2</sup>-60<sup>1</sup>)  
 ✓ • 24 A-7s<sup>1</sup>  
 ✓ • 20 EA-6Bs<sup>2</sup>  
 ✓ • 16 E-2Cs<sup>2</sup>  
 • 16 S-3Bs<sup>1</sup>  
 • 10 SA-3s<sup>1</sup>  
 • 6 SH-3H helicopt.<sup>1</sup>  
 • 50 Others



## PERSIAN GULF

Carriers (2) USS Ranger  
 & Midway  
 ✓ • 46 F-14s (114<sup>2</sup>-60<sup>1</sup>)  
 ✓ • 36 F/A-18s<sup>1</sup>  
 • 20 A-6Es<sup>1</sup>  
 • 4 E2-Cs Recon./C<sup>2</sup><sup>11</sup>  
 ✓ • 10 EA-6Bs ECM<sup>2</sup>  
 • 6 SH-3H helicopters<sup>11</sup>  
 • 20 other

Battleships (2) USS  
 Missouri & Wisconsin  
 • 82 Tomahawks each  
 Assault Carrier (3)

✓ • 36 AV-8B Harriers<sup>2</sup>  
 • ~40 helicopters  
 • USS Nassau - helicopter  
 carrier<sup>2</sup>  
 • USS Tripoli —

## Cruisers (6)

• 8 Tomahawks each

## Submarines (6 to 8)

• 4 Tomahawks each

## Total Fixed Wing Navy Aircraft

• Persian Gulf --- 178  
 • Red Sea --- 278  
 • Mediterranean --- 44  
 500

## Tomahawk Cruise Missiles

2 Battleships, 6 Cruisers,  
 6 to 8 Submarines... 500 total



## OTHER AIRCRAFT DEPLOYED IN THE MID-EAST THEATER

### USAF & USN

#### ● AIR TRANSPORT SORTIES

- CRAF 747s (12-15 SORTIES PER DAY FROM DOVER AFB, DEL.,) -- AW&ST, 4 FEBRUARY 1991
- C-5A and C-141 (DOVER AFB, DEL., FLYING 18-20 SORTIES PER DAY) -- AW&ST, 4 FEBRUARY 1991
- NUMBER C-130s (BASED ON CENTRAL SAUDI ARABIA) -- AW&ST, 21 JANUARY 1991
- 4 SQUADRONS OF EC-130 COMPASS CALL ELECTRONIC WARFARE PROTECTING NAVY C-9B TRANSPORTS FROM NAS NAPLES AND NAS SIGONELLA, ITALY -- AW&ST, 21 JANUARY 1991

#### ● AIR TANKERS

- KC-135s AND KC-10s (A WAVE BASED IN CENTRAL SAUDI ARABIA) -- AW&ST, 21 JANUARY 1991
- 1703rd AIR REFUELING WING AW&ST, 25 FEBRUARY 1991 (2 SQUADRONS ~20 AC)

### BRITISH

- RAF VC-10K, L-1011, AND VICTOR TANKERS -- AW&ST, 18 FEBRUARY 1991
- 6 BUCCANEER TARGET DESIGNATORS



## U.S. AND ALLIED LAND-BASED AIR-ORDER-OF-BATTLE - III

### FIXED WING COMBAT AIRCRAFT

|                            |       |
|----------------------------|-------|
| USAF.....                  | 932*  |
| SAUDI ARABIA.....          | 286   |
| BRITAIN .....              | 75    |
| KUWAIT AF IN EXILE .....   | 42    |
| FRANCE .....               | 55    |
| BELGIUM .....              | 18    |
| GERMANY .....              | 18    |
| ITALY .....                | 8     |
| OMAN .....                 | 63    |
| UNITED ARAB EMIRATES ..... | 41    |
| QATAR .....                | 19    |
| CANADA .....               | 24    |
| <hr/>                      |       |
| TOTAL                      | 1,581 |

\*TOTAL U.S. FIXED WING  
AC-1800<sup>7</sup>

### COMBAT HELICOPTERS

|                            |                                     |
|----------------------------|-------------------------------------|
| UNITED STATES .....        | 1,700 <sup>7</sup>                  |
| ● USAF .....               |                                     |
| ● MARINES .....            |                                     |
| ● NAVY .....               | 86                                  |
| ● ARMY .....               | 710 <sup>10</sup>                   |
| SAUDI ARABIA .....         | 24 <sup>5</sup>                     |
| BRITAIN .....              | 42 <sup>10</sup>                    |
| FRANCE .....               | 120 <sup>10</sup> + 38 <sup>4</sup> |
| KUWAIT IN EXILE .....      | 15 <sup>3</sup>                     |
| UNITED ARAB EMIRATES ..... | 19 <sup>5</sup>                     |
| QATAR .....                | 20 <sup>5</sup>                     |
| <hr/>                      |                                     |
| TOTAL                      | 1,940**                             |

\*\*1959 HELICOPTERS INCLUDING  
CARGO/TRANSPORT<sup>6</sup>

## U.S. AND ALLIED AIRCRAFT LOSSES DURING BUILDUP

- ABOUT 31 AIRCRAFT WERE LOST DUE TO ACCIDENTS WHILE MOVING AND TRAINING
  - RATIO OF ROUGHLY 1/2 FIXED WING AND 1/2 HELICOPTERS
- ALL AIRCRAFT GROUNDED ON 12 OCTOBER 1990 DUE TO RASH OF ACCIDENTS<sup>c</sup>

### ACCIDENTS PRIOR TO FIGHTING (2 AUGUST 1990 TO 16 JANUARY 1991) -- 7

- C-5A CRASHED IN GERMANY HEADED FOR GULF -- 29 AUGUST 1990<sup>b</sup>
- NAVY HELICOPTER CRASHED IN RED SEA -- 27 SEPTEMBER 1990
- F-15 CRASHED IN SAUDI ARABIA -- 30 SEPTEMBER 1990<sup>b</sup>
- 2 UH-1 HELICOPTERS CRASHED IN SAUDI ARABIA -- 8 OCTOBER 1990<sup>b</sup>
- RF 4C CRASHED ON RECONNAISSANCE TRAINING FLIGHT IN SAUDI ARABIA -- 8 OCTOBER 1990<sup>b</sup>
- EF-111 CRASHED DURING MOVE FROM ENGLAND<sup>e</sup> -- 10 OCTOBER 1990<sup>b</sup>

### OVERALL LOSSES (16 JANUARY 1991 TO 1 MARCH 1991) -- 60

- COMBAT LOSSES<sup>e</sup> -- 36
  - 27 U.S., 6 BRITISH, 1 KUWAIT, 1 ITALIAN, AND 1 SAUDI COMBAT FIXED WING
- NONCOMBAT LOSSES<sup>e</sup> -- 24
  - 7 U.S., 1 BRITISH, AND 1 SAUDI -- 9
  - 15 U.S. HELICOPTERS

### SOURCES:

- a. "GULF WATCH," LOS ANGELES TIMES, 16 OCTOBER 1990, PG. A-12.
- b. "DESERT SHIELD'S DEAD AND MISSING," OCEANSIDE BLADE CITIZEN, 12 OCTOBER 1990, PG. A-9.
- c. "GULF WATCH," LOS ANGELES TIMES, 12 OCTOBER 1990, PG. A-12.
- d. "OVER \$1 BILLION IN U.S. AIRCRAFT LOST BEFORE, DURING THE GULF WAR," THE SAN DIEGO UNION, 10 MARCH 1991, PG. A-16.
- e. "WAR TOTALS," LOS ANGELES TIMES, 28 FEBRUARY 1991, PG. A-3.



## DEFINITION OF VARIOUS MISSION TYPES

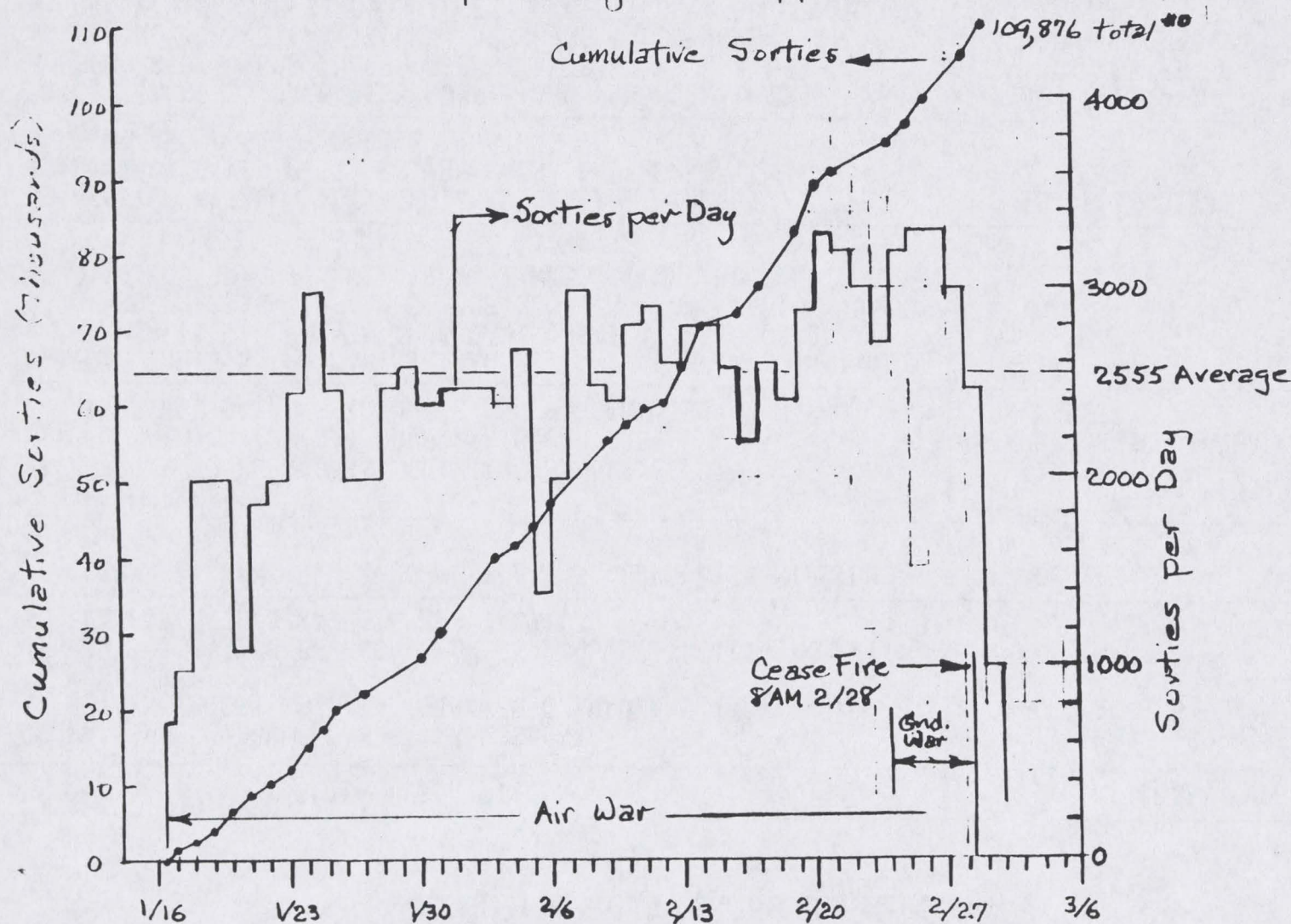
| MISSION DESCRIPTIONS                                                                                                                                                                                                                                                                                                                   | AIRCRAFT TYPES                                                                              |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------|
| <b>1. RECONNAISSANCE &amp; BOMB DAMAGE ASSESSMENT</b> <ul style="list-style-type: none"> <li>● OBTAIN TARGETING DATA (STRATEGIC/IRAQ AND TACTICAL/KUWAIT)</li> <li>● MONITOR STATUS OF ENEMY FORCES (MOSTLY TACTICAL/KUWAIT)</li> <li>● BDA FOR BOTH STRATEGIC AND TACTICAL</li> </ul>                                                 | TR-1, RF-4C, S2-A, EP-3,<br>F1-CR, RC-135                                                   |
| <b>2. C<sup>3</sup> -- COMMAND, CONTROL, &amp; COMMUNICATIONS OF ALLIED MISSIONS</b>                                                                                                                                                                                                                                                   | AWACS (E3), E2-C, F-16 FAC,<br>OV-10 FAC, E-8                                               |
| <b>3. DEFENSE SUPPRESSION</b> <ul style="list-style-type: none"> <li>● ATTACKS VS EW RADARS, GCI, AND SAM SITES/C<sup>3</sup></li> <li>● ECM JAMMING AND AIR COVER/INTERCEPTORS</li> <li>● AIR FIELD ATTACKS (RUNWAYS AND HANGARETTES)</li> </ul>                                                                                      | EF-111, F-14, F/A-18,<br>F-117, F-16, MIRAGE, F-4G,<br>EA-6B, S-3B, TORNADOES,<br>BUCCANEER |
| <b>4. STRATEGIC TARGETS (PRIMARILY IRAQ PLUS OIL PUMPING STATIONS)</b> <ul style="list-style-type: none"> <li>● WARHEAD DEVELOPMENTS (NUCLEAR, CHEMICAL, BIOLOGICAL)</li> <li>● C<sup>3</sup> SUPPRESSION (AF &amp; DEFENSE HDQ, TELECOM, RADIO, TV)</li> <li>● MISSILE, AMMUNITION, AIRCRAFT PRODUCTION AND ELECTRIC POWER</li> </ul> | F-117, F-15E, F-111, A-7E                                                                   |
| <b>5. SCUD MISSILE ATTACKS (STRATEGIC RELOCATABLE TARGETS)</b> <ul style="list-style-type: none"> <li>● DESTROY FIXED MISSILES, RELOADS, AND SUPPORT</li> <li>● FIND AND DESTROY MOBILE MISSILES</li> </ul>                                                                                                                            | F-15, F-16, F-111, A-10                                                                     |
| <b>6. TACTICAL TARGETS (PRIMARILY KUWAIT AND SOUTHERN IRAQ)</b> <ul style="list-style-type: none"> <li>● BOMB REPUBLICAN GUARDS DEPLOYMENTS</li> <li>● DESTROY TANKS, ARTILLERY, APCs AND C<sup>3</sup> BUNKERS</li> <li>● CLEAR MINES, DESTROY BRIDGES, LOGISTICS, AMMO DEPOTS</li> </ul>                                             | B-52, A-6, A-7, TORNADOES,<br>OV-10s, AV-8B, F-15,<br>A-4 KU, JAGUAR                        |
| <b>7. GROUND FORCES SUPPORT</b> <ul style="list-style-type: none"> <li>● HELICOPTER MOVEMENT OF FORCES</li> <li>● EXPLOIT EXPOSED OR MOVING TARGETS</li> </ul>                                                                                                                                                                         | OV-10, AH-64A, AV-8B,<br>C-130 GUN SHIPS                                                    |
| <b>8. AIR REFUELING AND CARGO</b>                                                                                                                                                                                                                                                                                                      | KC-10, KC-135, C-130,<br>C-141, C-5A                                                        |



# US AND ALLIED AIR SORTIES GENERATED VS TIME

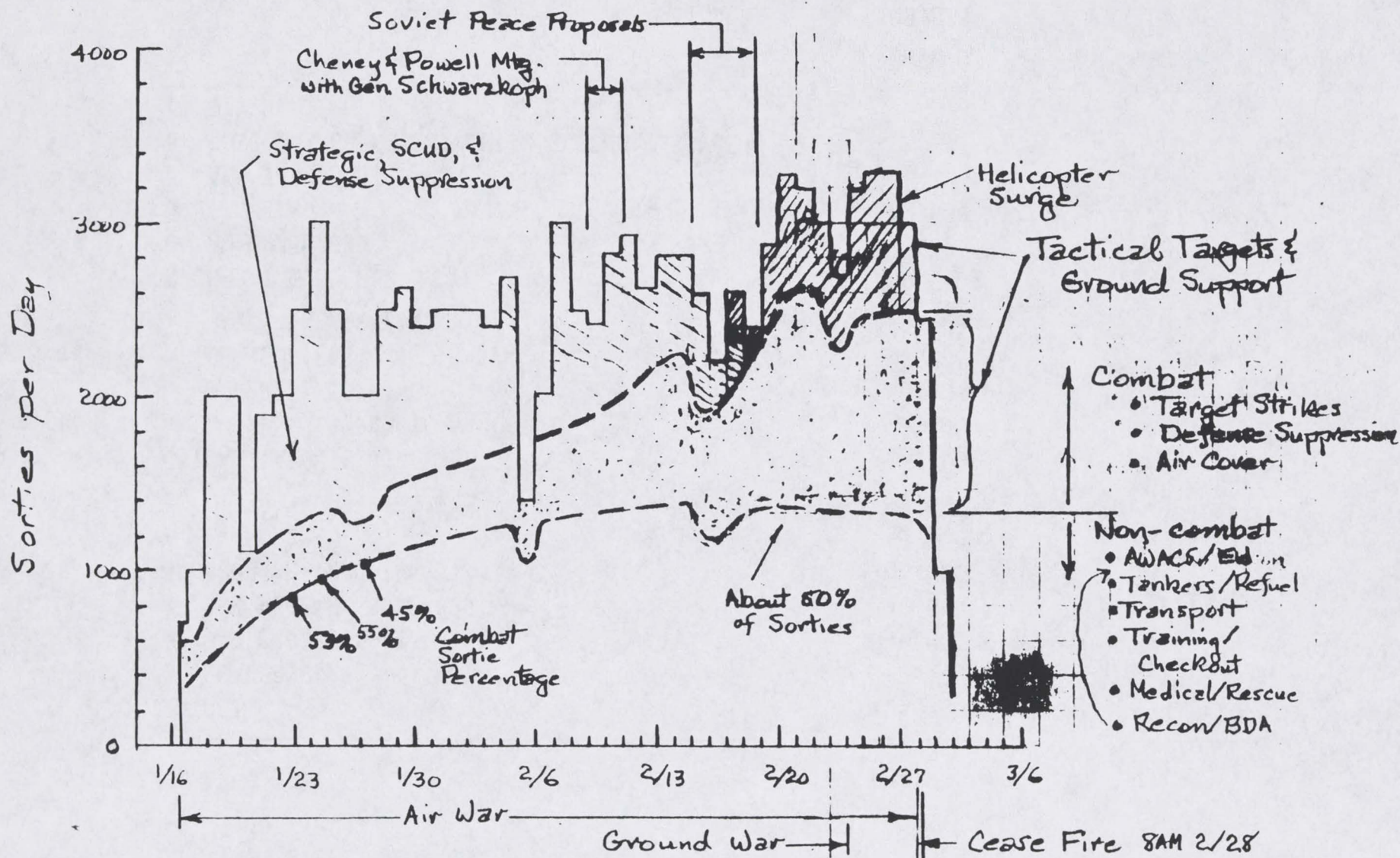
Data based on daily joint command press releases

- Includes both land- and sea-based fixed wing aircraft
- Includes helicopter flights in support of land and sea operations





# ESTIMATED DISTRIBUTION OF SORTIES VS MISSIONS



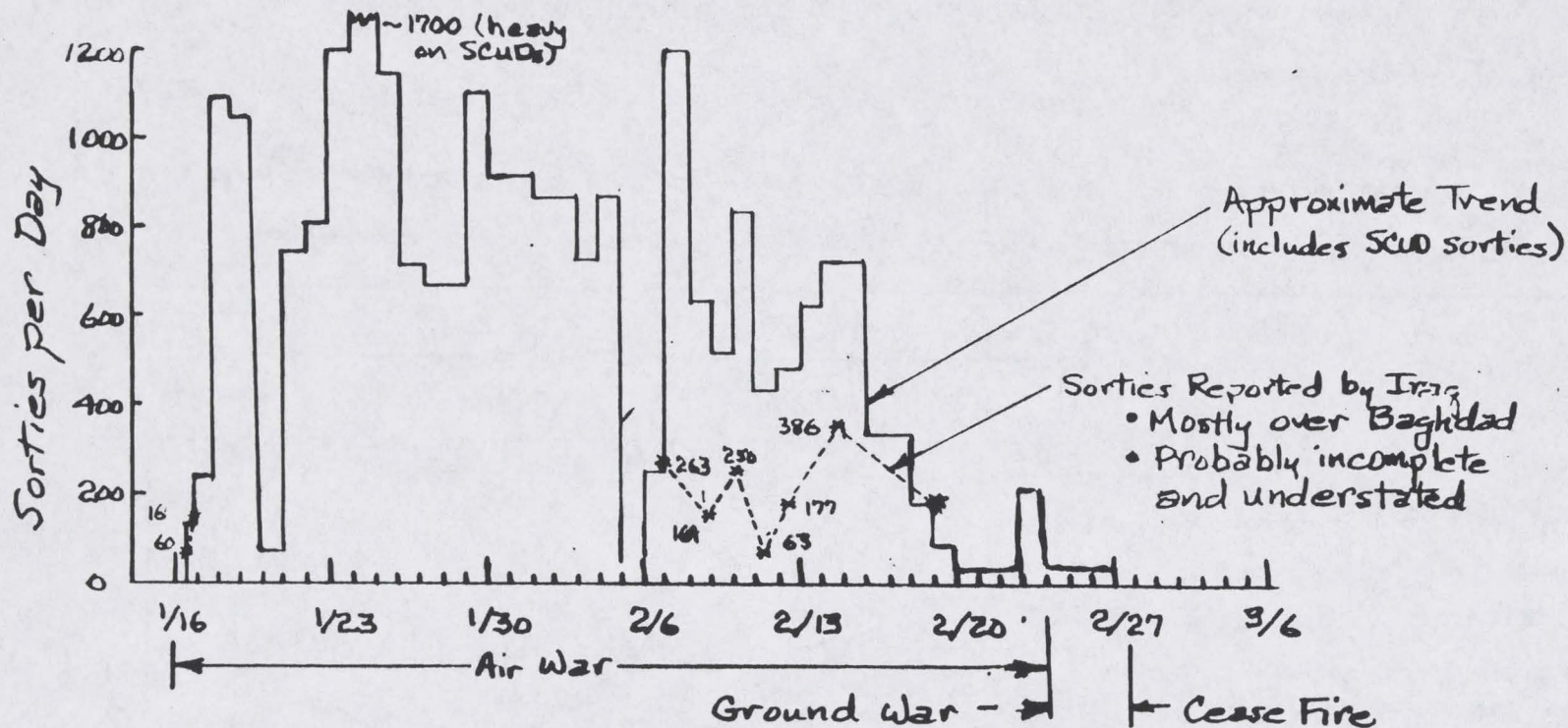
# APPROXIMATE DISTRIBUTION OF SORTIES BY MISSION

| <u>MISSIONS</u>                           | <u>ESTIMATED<br/>SORTIES</u> | <u>PERCENT<br/>OF TOTAL</u> |
|-------------------------------------------|------------------------------|-----------------------------|
| STRATEGIC                                 | (24,300)                     | (22.1)                      |
| ● LEADERSHIP*                             | ~1,200                       | ~1.1                        |
| ● WAR PRODUCTION*                         | ~6,600                       | ~6.0                        |
| ● AIR DEFENSE SUPPRESSION*                | ~10,000                      | ~9.1                        |
| ● SCUD DESTRUCTION                        | ~4,000                       | ~3.6                        |
| ● BRIDGES*                                | ~1,500                       | ~1.4                        |
| ● OTHER INDUSTRIES & BUNKERS*             | ~1,000                       | ~0.9                        |
| TACTICAL TARGETS & GROUND SUPPORT         | (35,300)                     | (32.1)                      |
| ● B-52s VS REPUBLICAN GUARDS              | ~1,400                       | 1.3                         |
| ● OTHER FIXED WING                        | 25,900                       | 23.6                        |
| ● HELICOPTERS                             | 7,000                        | 6.4                         |
| ● NAVAL ENGAGEMENTS                       | ~1,000                       | 0.9                         |
| NON-COMBAT & SUPPORT                      | (50,200)                     | (45.7)                      |
| ● AWACS/EW/C <sup>3</sup>                 | ~650                         | ~0.6                        |
| ● TANKERS                                 | ~2,500                       |                             |
| ● AIR TRANSPORT                           |                              |                             |
| ● BOMB DAMAGE ASSESSMENT & RECONNAISSANCE |                              |                             |
| ● OTHER                                   |                              |                             |
| TOTAL ESTIMATE                            | 109,800                      | 99.9                        |
| ACTUAL                                    | 109,876                      | 100.0                       |

\*PLUS 284 TOMAHAWK CRUISE MISSILES



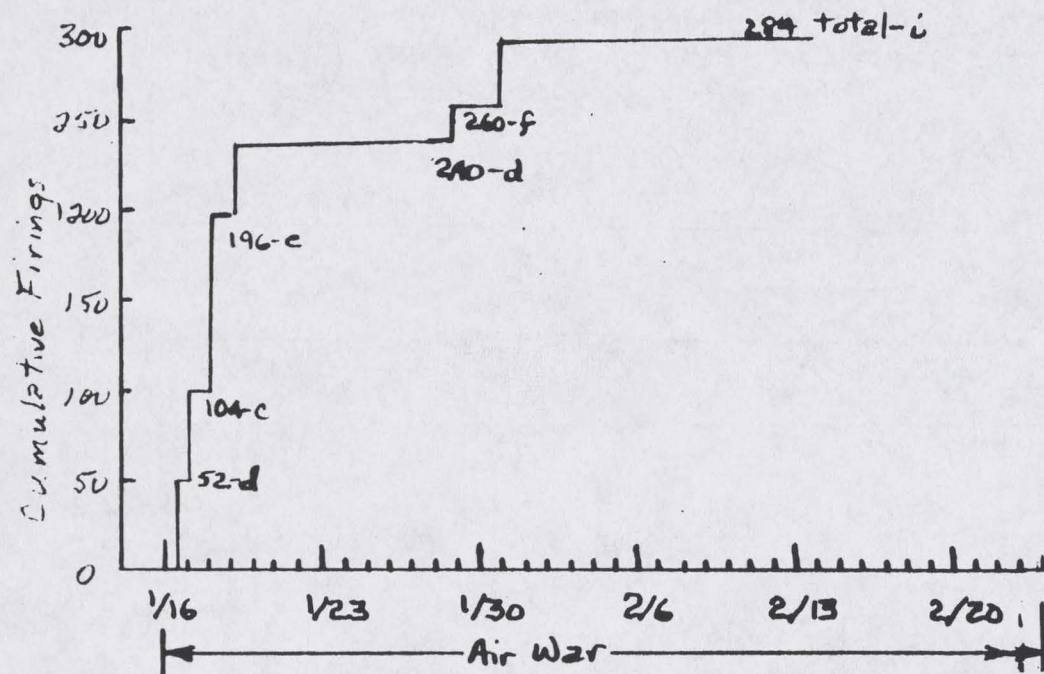
## STRATEGIC BOMBING & DEFENSE SUPPRESSION



### OBSERVATIONS

- Heavy attacks on Leadership, C<sup>3</sup>, Air Defense, and War Production (1/16 to 1/20) -- brief pause
- Reattacks plus Bridges, Hangarages, Bunkers (1/21 to 2/5)
  - Included major effort against SCUDs (1/24 to 1/26)
  - Two weeks of airfield attacks as planes flew to Iran
- Third series of attacks versus bridges, secondary leadership ministries, oil refineries, pipelines, and SCUD sites (2/6 to 2/20)
- Strategic attacks continued until 2/27

# TOMAHAWK LAUNCHINGS AGAINST STRATEGIC TARGETS



## OBSERVATIONS

- Reliability > 0.9
- None appeared to be shot down... but Iraq claimed:  
 Several shot down  
 - A score were duds
- 50 to 100 were modified to extend range from submarines

- Used against first targets (C<sup>3</sup> Hdq., Presidential Palace, EW/Defense Radars)
- Used against heavily defended targets which required Division  
 Gen. Colin Powell
- Used against nuclear, chemical, and biological facilities  
 Gen. Norman Schwarzkopf
- Used to offset further loss of pilots after first few days
- Later firings against Bridges and Bunkers in Baghdad (2-6-91)



## SUMMARY OF STRATEGIC TARGETS AND U.S. PLANS\*

### "BLACK HOLE" TARGET PLANNING CENTER

- ROYAL SAUDI AF HDQ. RIYADH -- TURNED OVER TO U.S., BRIG. GEN. B. C. GLOSSON
- THREE ORGANIZATIONS -- PRIMARY WAR PRODUCTION (STRATEGIC TARGETS)
  - REPUBLICAN GUARDS AND KUWAIT (TACTICAL TARGETS)
  - TARGETS OF OPPORTUNITY (KUWAIT & SCUDs)
- BEGAN OPERATIONS IN MID-AUGUST 1990 -- LACKED TARGETING DATA
  - USED AVAILABLE DIA AND CIA DATA BASES
  - TEAM FROM ARMY INTELLIGENCE AND SECURITY COMMAND HELPED
  - CIA INTERVIEWED EUROPEAN AND ASIAN CONTRACTORS AND WORKERS
  - FRENCH SUPPLIED DATA ON HOW TO NEUTRALIZE EW/AIR DEFENSE RADARS
  - CIA AND DIA AGENTS INFILTRATED IRAQ AND KUWAIT

### FIVE GUIDING PRIORITIES

- DESTROY IRAQI LEADERSHIP AND C<sup>3</sup> NETWORK
- BLIND THE EW RADARS AND SAM DEFENSES AND GROUND THE AIR FORCE
- DESTROY FACTORIES, LABS, AND DEPOTS SUPPORTING THE MILITARY
- WRECK AIRFIELDS, PORTS, AND TRANSPORTATION (HIGHWAYS AND RAILROADS)
- DEVASTATE THE REPUBLICAN GUARDS AND TOP GROUND FORCES

### DEFINED AIR CAMPAIGN IN FOUR PHASES

- PHASE 1: KNOCK OUT C<sup>3</sup>, LEADERSHIP, PRIMARY STRATEGIC TARGETS, AND SCUDs
- PHASE 2: SUPPRESS EW, SAM RADARS, AIRFIELDS, AND AIR DEFENSE C<sup>3</sup>
- PHASE 3: CUT SUPPLY LINES SOUTH, ISOLATE AND ATTRIT GROUND FORCES
- PHASE 4: PROVIDE CLOSE SUPPORT FOR GROUND INVASION

\*"THE SECRET HISTORY OF THE WAR," NEWSWEEK, 18 MARCH 1991, PAGES 28-39.

## SUMMARY OF STRATEGIC TARGETS ATTACKED - I

### FIRST DAY (1/16/91-1/17/91) -- BAGHDAD AREA

| WEAPON SYSTEM | TARGETS ATTACKED | INITIAL SORTIES | SORTIES PER TARGET |
|---------------|------------------|-----------------|--------------------|
| F-117         | 26 <sup>39</sup> | ~60             | 2                  |
| TOMAHAWK      | 26 <sup>39</sup> | ~50             | 2                  |

HOURS AFTER  
3:00AM (1/17/91)

TOTAL AIRCRAFT  
SORTIES FLOWN<sup>100</sup>

|    |      |
|----|------|
| 7  | 750  |
| 14 | 1000 |
| 21 | 1200 |
| 24 | 1500 |

### EMPHASIS ON LEADERSHIP, C<sup>3</sup> AND AIR DEFENSE -- 26 TARGETS

- PRESIDENTIAL PALACE
- BATH PARTY CONFERENCE HEADQUARTERS
- MINISTRY OF DEFENSE
- COUNCIL OF MINISTERS
- AIR FORCE HEADQUARTERS
- AIR DEFENSE C<sup>3</sup>/GCI HEADQUARTERS
- REGIONAL EW/SAM RADARS
- AT&T TELECOMMUNICATIONS
- OTHER MILITARY COMMUNICATIONS
- TAJI ELECTRIC POWER STATION AND SELECTED OTHER POWER PLANTS

### DAMAGE RESULTS ON 26 INITIAL TARGETS<sup>102</sup>

- 60 PERCENT OF TARGETS DAMAGED OR DESTROYED
- 25 PERCENT OF ELECTRIC POWER PLANTS INOPERATIVE AND 50 PERCENT MORE CURTAILED
- 75 PERCENT OF C<sup>3</sup> WAS STRUCK AND 33 PERCENT DESTROYED OR INOPERATIVE



## SUMMARY OF STRATEGIC TARGETS ATTACKED - II

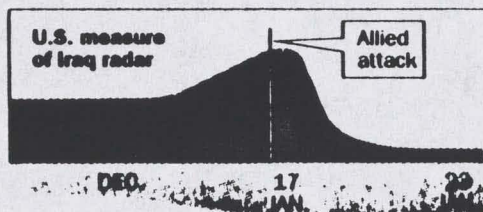
### AIR DEFENSE SUPPRESSION DURING FIRST FEW DAYS (1/16/91-1/20/91) -- COUNTRY WIDE

- 29 TARGET HIT, NOT INCLUDING AIRFIELDS
- 800 SORTIES FLOWN (~28 SORTIES/TARGET)

SOURCE: #102

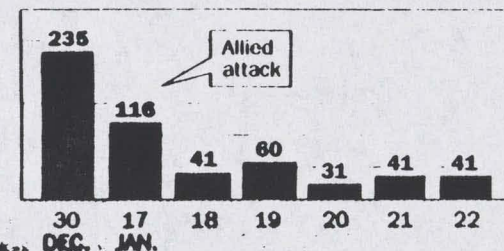
#### **RADAR ACTIVITY**

- Early Warning
- Surface-to-Air Missiles and Anti-Aircraft Artillery



#### **FLIGHT ACTIVITY**

U.S. count of Iraqi sorties.



SOURCE: LA TIMES, 24 JAN. 1991, PAGE A-7.

### FIRST TWO WEEKS (1/16/91-1/30/91) -- COUNTRY WIDE

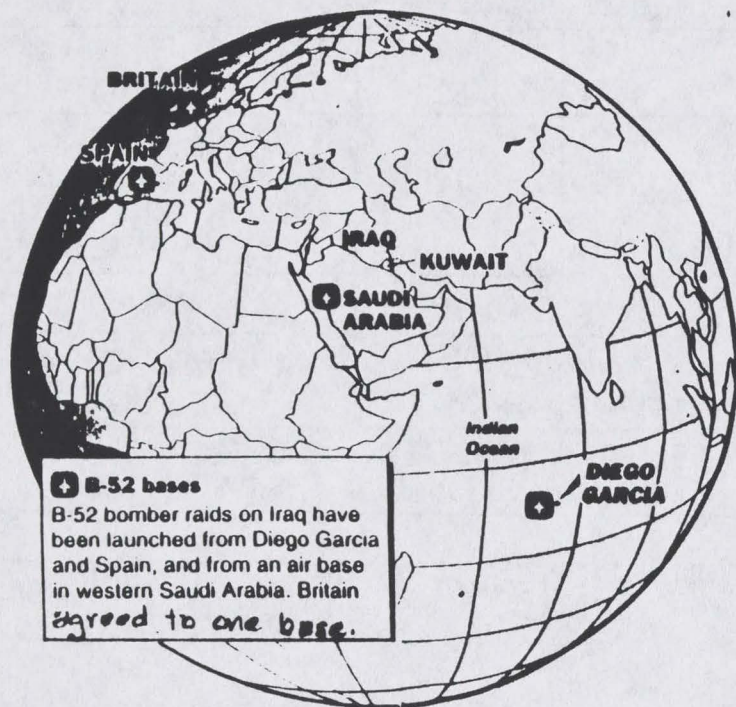
| TARGET CLASSES & WEAPONS                        | TARGETS ATTACKED       | TOTAL SORTIES              | SORTIES PER TARGET |
|-------------------------------------------------|------------------------|----------------------------|--------------------|
| LEADERSHIP<br>● AC & TOMAHAWK                   | 26 <sup>59</sup>       | 800 <sup>59,63</sup>       | 31                 |
| HARD C <sup>3</sup> BUNKERS                     | 10 OF 25 <sup>67</sup> | ?                          | ?                  |
| PRIMARY WEAPON PRODUCTION<br>● AC<br>● TOMAHAWK | 31<br>31               | 535 <sup>102</sup><br>~150 | 17<br>5            |
| AIRFIELDS<br>● AC                               | 38 <sup>102</sup>      | 1340                       | 35                 |
| BRIDGES<br>● AC                                 | 33 <sup>59</sup>       | 790 <sup>59</sup>          | 24                 |

#### EMPHASIS EXPANDED TO INCLUDE:

- RESTRIKE OF LEADERSHIP
- HARD C<sup>3</sup> BUNKERS
- PRIMARY WEAPON SYSTEM PRODUCTION
  - CHEMICAL, BIOLOGICAL, & NUCLEAR
  - MISSILES & ELECTRONICS
  - AMMUNITION & ARMOR PRODUCTION
- AIRFIELDS
  - RUNWAYS & AC ON GROUND
  - HANGARETTES
- HIGHWAY AND RAILROAD BRIDGES



## B-52 BOMBER BASING AND OVERFLIGHT ISSUES



Foreign Basing and Operations of B-52s carry two politically negative considerations:

- Association with nuclear weapons
- Indiscriminate carpet-bombing of civilian areas in North Vietnam

### RESULTING CONSTRAINTS

- Egypt opposed basing and operations on its territory
- Saudi Arabia refused bases in August 90 -- permitted operations (overflights and refueling) by 1 Feb 91
- France approved overflights on 1 Feb 91
- Spain secretly permitted basing and overflights of "conventionally armed B-52s only" during Dec. 90
- England originally ~~refused~~, then agreed to single base under condition "an absolute assurance B-52s will only use conventional munitions operating from that base"
- Syria overflights not permitted due to White House policy --- not Syrian

### APPARENT FORCES (56)

- Diego Garcia -- 3 Squadrons (21 AC)
  - used for initial attacks
  - 3000 mile flight to Iraq.
- Moron, Spain -- 2 Squadrons (18 AC)
  - Operational by mid-Jan. 91
  - Overfly southeast Turkey
- Fairford, England -- 1 Squadron (10 AC)
  - Operational by 4 Feb. 91
  - Overfly Spain and Turkey



## COMMENTS ON B-52 OPERATIONS

### INITIAL ATTACKS

- WAVE OF 20 B-52s FROM DIEGO GARCIA HIT ON 1/17/91
  - MAIN TARGET WAS REPUBLICAN GUARDS IN KUWAIT/SOUTHERN IRAQ
  - SOME FIXED TARGETS NEAR BAGHDAD MAY HAVE BEEN ATTACKED<sup>92</sup>

### CARPET BOMBING OF REPUBLICAN GUARDS

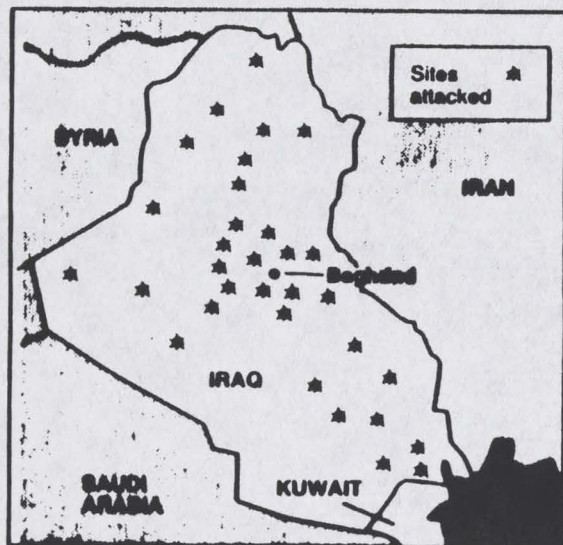
- STARTED AT LOW ALTITUDES (200-500 FT)<sup>114</sup>
  - INCREASED ALTITUDE TO ABOVE AAA BY SECOND WEEK
  - LOST ONE B-52 IN INDIAN OCEAN DUE TO MECHANICAL FAILURE (2/3/91)<sup>60</sup>
- DELIVERED 15 TO 17 TONS PER SORTIE<sup>58,101</sup>
  - MARK 80 SERIES BOMBS VERSUS BUNKERS AND EQUIPMENT (NOT VERY EFFECTIVE DUE TO POOR ACCURACY)<sup>61</sup>
  - BLU-97 CLUSTER BOMBS VERSUS TROOPS AND VEHICLES (ONLY MIXED RESULTS DUE TO DISPERSAL OF ARMOR AND SAND-BAY/TRENCHES PROTECTION OF PERSONNEL)<sup>61</sup>
- GREATEST EFFECTIVENESS VERSUS TROOPS WAS PSYCHOLOGICAL SHOCK<sup>61</sup>

### OTHER MISSIONS

- DIVERTED IN-FLIGHT ON TWO OCCASIONS TO HIT MOBILE TARGETS
  - TROOP CONVOY SPOTTED TRYING TO MOVE ON ROAD
  - IDENTIFIED SCUD SITE AND LAUNCHERS (2/20/91)<sup>75</sup>
- HIT FIXED TACTICAL TARGETS NORTH OF BASRA<sup>114</sup>



## SUMMARY OF WEAPON PRODUCTION TARGETS ATTACKED - I



- OTHER MILITARY PRODUCTION -- 5
  - MANSUR -- ELECTRONICS<sup>29</sup>
  - TAJI -- 105 & 203 mm CANNONS PRODUCED, TANK DEPOT<sup>103</sup>
  - AL DOUR -- SAAD-13 ELECTRONICS
  - AL ISKANDRIYAH -- AMMUNITION PRODUCTION

### TARGET DATA BASE -- 31 PRIMARY LOCATIONS<sup>59, 102</sup>

- NUCLEAR PLANTS & RESEARCH -- 5
  - AL QAIM -- URANIUM PROCESSING & CHEMICALS<sup>29</sup>
  - TAWAITHA -- NUCLEAR MATERIALS<sup>29, 108</sup>
  - IRBIL -- NUCLEAR MATERIALS & PROCESSING<sup>48</sup>
  - TADJI -- FACTORY 10 NUCLEAR CENTRIFUGES<sup>107</sup>
  - MOSUL -- NUCLEAR WARHEAD R&D
- CHEMICAL & BIOLOGICAL PLANTS -- 13
  - SALMAN PAK -- CHEMICAL & BIOLOGICAL WEAPON HDQ. R&D
  - SAMARRA -- WEAPON PRODUCTION
  - AKASHAT -- CHEMICAL WEAPONS
  - MOSUL -- CHEMICAL WARHEAD/MISSILE DESIGN
  - BAIJI -- CHEMICAL MATERIALS
  - AL ISKANDRIYAH -- CHEMICAL WEAPON ASSEMBLY
  - MUSAYYIB -- CHEMICAL MATERIALS
  - BADUSH -- CHEMICAL (MAYBE BIOLOGICAL) WEAPONS
  - AL FALLUJAH -- CHEMICAL PLANT<sup>48</sup>
  - WEAPON STORAGE SITES (4)
- MISSILE PLANTS, TEST, AND DEPLOYMENTS -- 8
  - AL ANBAR -- R&D LAUNCH FACILITY
  - KARBALA -- MISSILE TESTING<sup>48</sup>
  - AL HILLAH -- DO-1 ROCKET FUEL PLANT
  - MOSUL -- SAAD-16 MISSILE R&D
  - AL FALLUJAH -- DO-2 MISSILE PLANT AND PROJECT 124 SCUD PLANT<sup>48</sup>
  - H-2 AND H-3 DEPLOYMENT SUPPORT BASES



## SUMMARY OF STRATEGIC TARGETS ATTACKED - III

### OTHER TARGETS HIT DURING FIRST FEW WEEKS

- DAM/HYDROELECTRIC PLANT ON THE TIGRIS RIVER IN FAR NORTH<sup>115</sup>
- POL REFINERIES AT BASRA, KIRKUK, AND BAGHDAD<sup>20</sup>
- NATURAL GAS PLANT NEAR KIRKUK<sup>115</sup>
- FERTILIZER PLANT NEAR BASRA<sup>115</sup>
- MUNITIONS TESTING AREA ABOUT 50 MILES SOUTHWEST OF BAGHDAD<sup>115</sup>

### OTHER SECONDARY LEADERSHIP TARGETS ATTACKED

- MINISTRY OF LOCAL GOVERNMENTS ON 1/22/91<sup>66</sup>
- MINISTRY OF JUSTICE ON 2/13/91<sup>66</sup>
- PALACE OF CONFERENCES ON 2/13/91<sup>67</sup>

### POSSIBLE KUWAITI TARGETS ATTACKED

- KUWAIT UNIVERSITY
- KUWAIT INTERNATIONAL AIRPORT
- MINA ACHMEDI OIL REFINERY OUTSIDE KUWAIT CITY

## ACHIEVING AIR SUPERIORITY - I

### IRAQ PREWAR INVENTORY

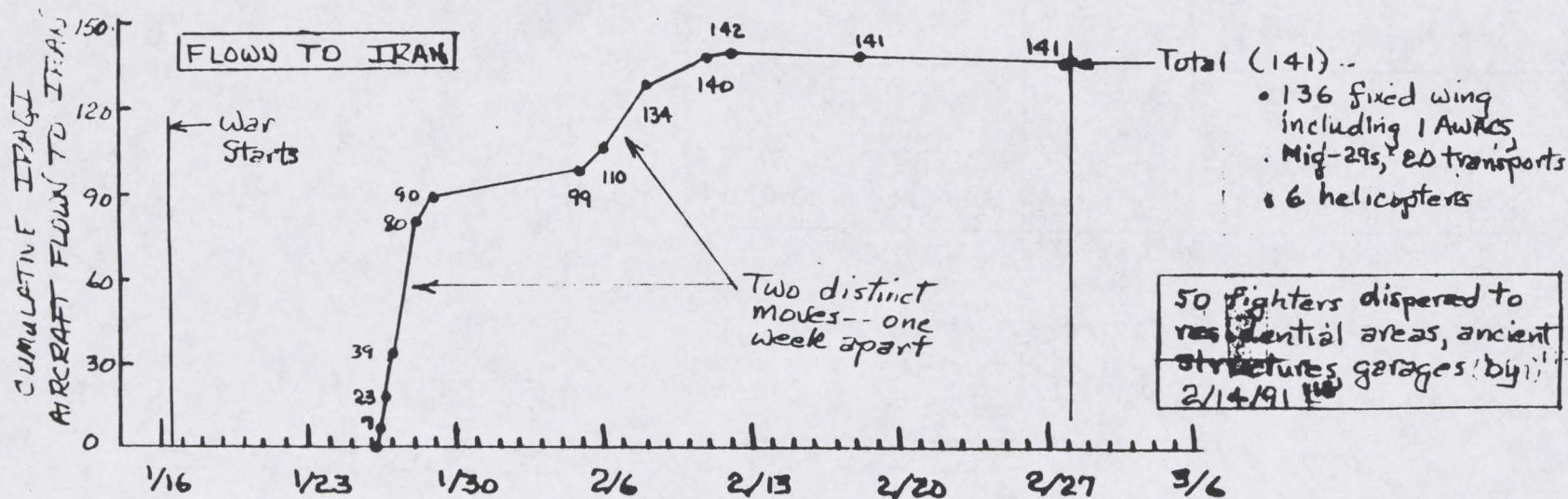
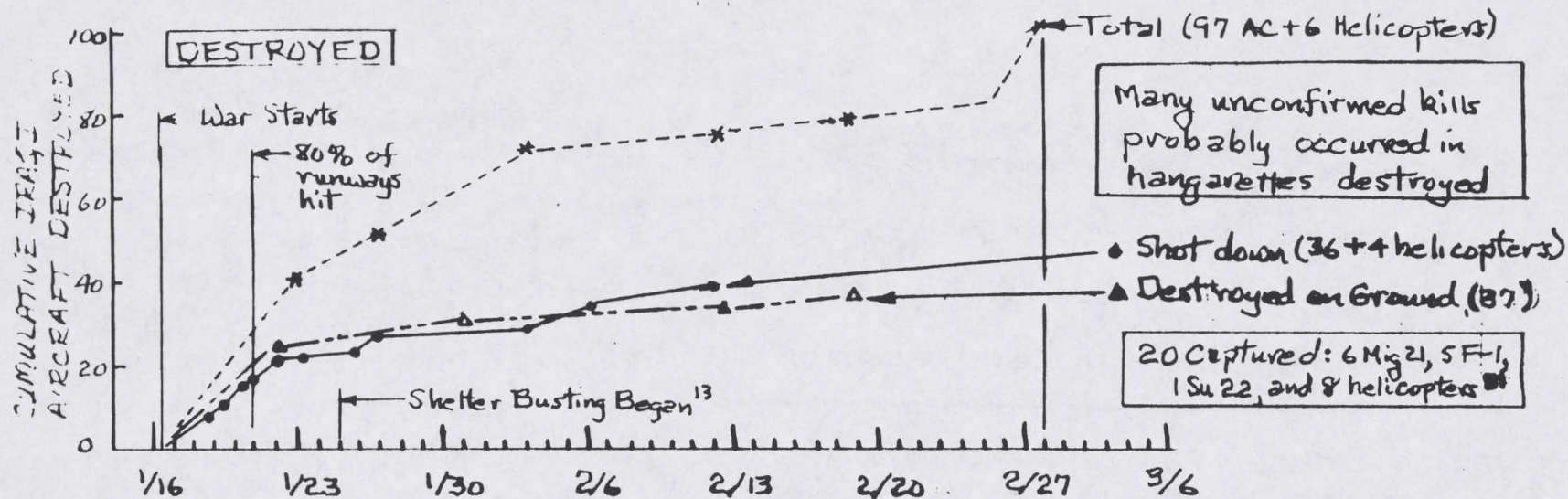
- TOTAL COMBAT FIXED WING AIRCRAFT -- 809<sup>101</sup>
    - 213 DEFENSIVE INTERCEPTORS
    - 312 OFFENSIVE STRIKE AIRCRAFT, BOMBERS, & RECCE/ATTACK
    - >284 TRANSPORTS, AWACS, TRAINERS, AND OTHERS
- } OFFENSE & DEFENSE USE  
DIFFERENT EQUIPMENT AND  
SOME DIFFERENT BASES

### IRAQ APPARENT STRATEGY

- OFFENSIVE AIRCRAFT
  - PLANNED TO RIDE OUT INITIAL ATTACKS IN ABOUT 90 VERY HARD SHELTERS (SIMILAR TO DISPERSAL TACTIC USED IN PERSIAN GULF WAR OF SEPTEMBER 1980)
  - MANY DESTROYED IN SHELTERS DURING FIRST WEEK (1/6/91-1/22/91) DUE TO ACCURACY AND PENETRATION OF I-2000 BOMBS
  - FLEW ABOUT 139 AIRCRAFT TO IRAN TO PREVENT DESTRUCTION (1/25/91 TO 2/12/91)
  - DISPERSED MANY OTHERS ON ROADS, AT MOSQUES, AND HISTORIC SITES TO HIDE THEM AND DISCOURAGE ATTACKS (1/25/91 TO 2/12/91)
- DEFENSIVE AIRCRAFT
  - ATTEMPTED TO DO BATTLE -- 30 SORTIES FIRST DAY<sup>32</sup>
    - RUNWAYS CUT BY BRITISH AND FRENCH ATTACKS (1/16/91 TO 1/22/91)
    - MOUNTED >80 SORTIES PER DAY DURING FIRST WEEK<sup>101</sup>
    - LOST ABOUT 20 AIRCRAFT IN FLIGHT DURING FIRST WEEK<sup>101</sup>
  - LOSS OF C<sup>3</sup>/GCI TARGETS PREVENTED COORDINATED DEFENSE
    - 26 LEADERSHIP AND C<sup>3</sup> TARGETS BOMBED
    - BEST AWACS AIRCRAFT FLOWN TO IRAN
  - AIR DEFENSE OPERATIONS VIRTUALLY ENDED BY SECOND WEEK (1/28/91)
    - ONLY 30-40 SORTIES PER DAY INCLUDING THOSE TO IRAN<sup>101</sup>



## ACHIEVING AIR SUPERIORITY - II





# SUMMARY OF AIRFIELD ATTACKS



## Primary Airfields Hit (1/16-1/20)

- ✓ 1. Tikrit
- ✓ 2. Jalibah
- ✓ 3. Tallil
- ✓ 4. Tall Afar
- ✓ 5. Al Asad
- ✓ 6. Baland
- ✓ 7. Mosul
- ✓ 8. Kirkuk
- ✓ 9. Shaik-Mazhur
- ✓ 10. Al Jerrah
- 11. Al Amarah
- 12. Qayyarah
- 13. H-2
- 14. H-3 & Dispers.
- 15. Basra
- 16. Kuwait Internat.
- 17. Rashid
- 18. Baghdad
- 19. Al Fallujah

## AIRFIELD DATA BASE -- 66 total<sup>45</sup>

- 16 Primary
  - 28 Dispersal
  - 22 Other Dispersal, Highway Strips and Expedition
- } 44 On initial list<sup>17, 59</sup>

## CUMULATIVE ATTACK RESULTS

| Dates & Sources             | Airfields Attacked | Cum. Sorties       | Sorties per Airfield <sup>45</sup> | AC Lost on Gnd. <sup>8</sup> |
|-----------------------------|--------------------|--------------------|------------------------------------|------------------------------|
| 1-24 (1 week) <sup>45</sup> | 25                 | ~1000 <sup>9</sup> | ~40 <sup>9</sup>                   | ~19                          |
| 1-31 (2 weeks) <sup>9</sup> | 38                 | 1340               | 35                                 | 29                           |

\* Many sorties were devoted to closing runways, suppressing defenses, and assessing damage

- 80 percent of runways hit by 1/21<sup>29</sup>
- 61 of 65 airfields hit by 1/24<sup>45</sup>
- Shelter-busting attacks began 1/25<sup>13</sup>
- Three airfields captured (1/25-2/26)<sup>122</sup>
  - Tallil
  - Jalibah
  - Shaik-Mazhur



## AIRFIELD HARD HANGARETTE ATTACKS



KIRKUK: BASE FOR MIG-21s --  
HIT 1/30/91 BY F-117

- SHELTER-BUSTING ATTACKS BEGAN ON 1/23/91<sup>13</sup>
- 61 OF 65 AIRFIELDS ATTACKED BY 1/25/91<sup>45</sup> -- IRAQ  
BEGAN MOVING AIRCRAFT TO IRAN THAT DAY<sup>68</sup>
- ESTIMATE THAT ABOUT 65% OF AIRFIELDS WERE OPERATIONAL  
ON 1/29/91<sup>14</sup>
- 70 HANGARETTES HIT BY 1/30/91<sup>59</sup>
- 68 AIRCRAFT IN SHELTERS DECLARED DESTROYED BY  
2/3/91<sup>41,60</sup>



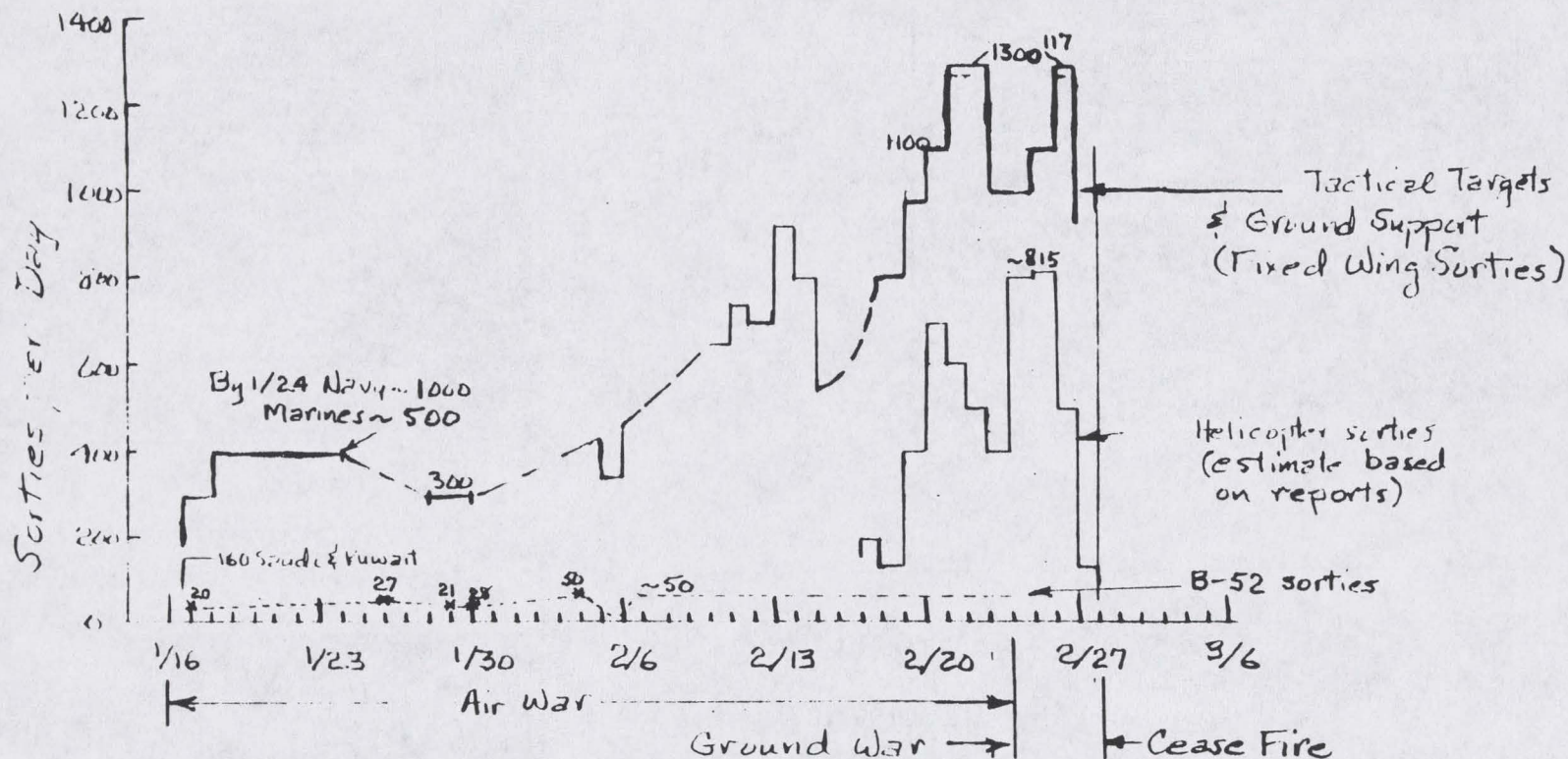
H-2: AIR DEFENSE AND SCUD MISSILE  
BASE -- HANGARETTE EXPLODED



KIRKUK: AIR DEFENSE BASE --  
HIT BY F-117s



## TACTICAL TARGETS AND GROUND SUPPORT MISSIONS

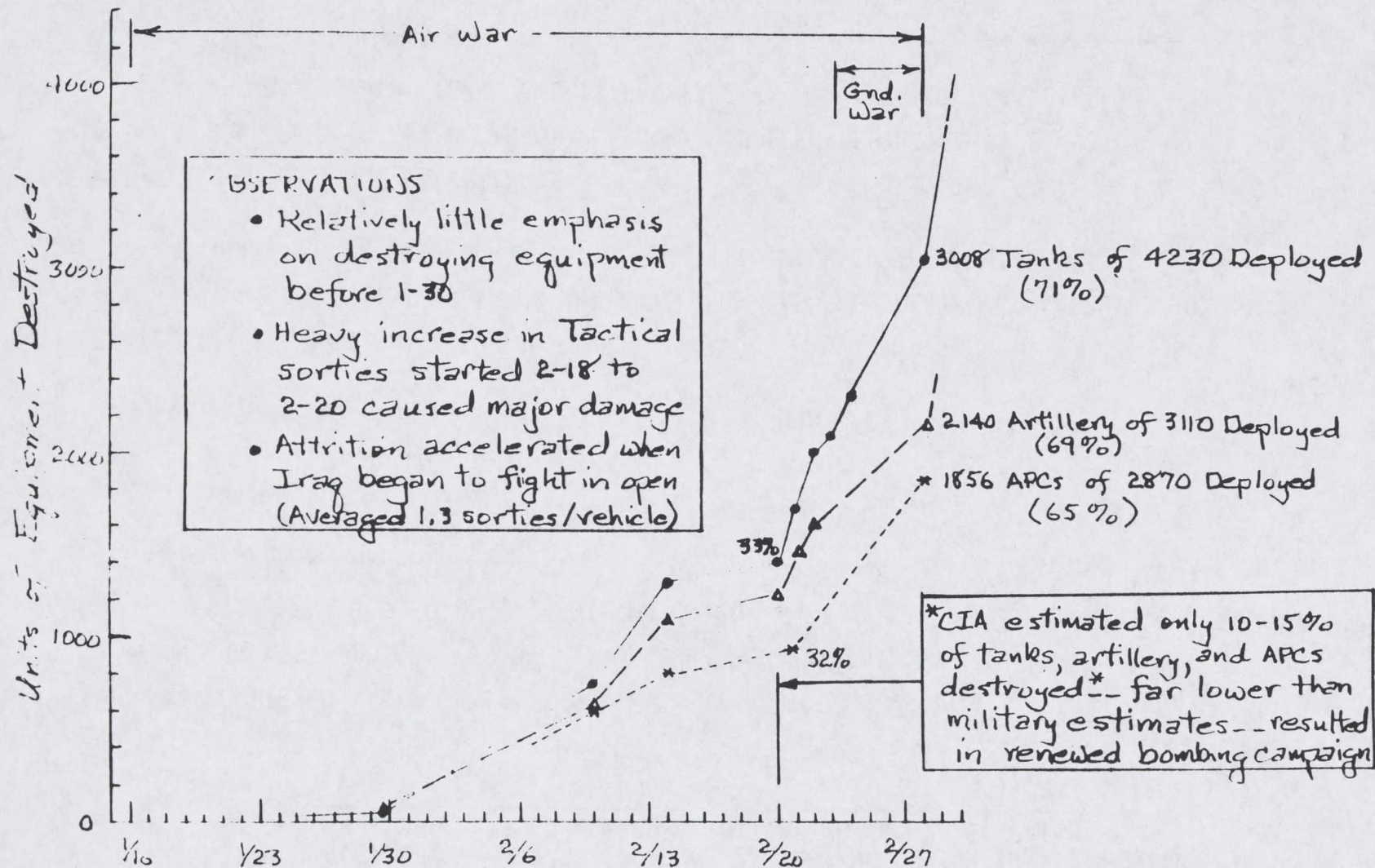


### OBSERVATIONS

- B-52s used in tactical role --- carpet bombing Republican Guards
  - 3 Squadrons through 1/30 then increased to 6 squadrons
- Helicopter activity surged in mid-February --- to 800+ sorties per day
  - Gunships attacking Tanks, APCs, and Artillery 2/17 to 2/23
  - Transports and gunships during Ground War 2/24 to 2/28
- Fixed wing strike aircraft
  - 250 to 300 sorties per day (Navy & Allies) to about 2/6
  - 600 to 800 sorties per day against Tanks, APCs, & Arty. after 2/6



# TACTICAL TARGETS & GROUND SUPPORT AIR WAR



Sources: • Daily newspaper statements  
 \* "Soviet Peace Plan Weighed As Gulf Ground War Looms," AWFS, 25 Feb. 1991, pgs 20-22

## MAJOR DIFFERENCES IN INTELLIGENCE ESTIMATES

|                                                                                                              |
|--------------------------------------------------------------------------------------------------------------|
| THEATER COMMAND SET GOAL OF DESTROYING 50% OF IRAQI ARMOR<br>AND ARTILLERY BEFORE INITIATING GROUND CAMPAIGN |
|--------------------------------------------------------------------------------------------------------------|

### THEATER COMMAND

- MONITORED TANKS, APCs, AND ARTILLERY DESTROYED VS TIME
- CAMPAIGN WAS DELAYED BY BAD WEATHER/POOR VISIBILITY
- STATEMENT ISSUED ON 2/19/91 INDICATED:

| <u>DEPLOYED EQUIPMENT</u>   | <u>DESTROYED</u>   | <u>PERCENT</u> |
|-----------------------------|--------------------|----------------|
| 4280 TANKS <sup>2</sup>     | 1685 <sup>75</sup> | 39.4           |
| 3110 ARTILLERY <sup>2</sup> | 1485 <sup>75</sup> | 47.7           |
| 2800 APCs <sup>2</sup>      | 800 <sup>98</sup>  | 28.6           |

- POSITION: ALMOST READY TO INITIATE GROUND WAR

### CIA POSITION<sup>85, 98, 119</sup>

- ONLY 10 TO 15% OF TANKS AND ARTILLERY HAD BEEN DESTROYED (ABOUT 2/19/91)
- HOLD OFF ON GROUND WAR UNTIL MORE ATTRITION IS ACCOMPLISHED

### ISRAELI INTELLIGENCE ESTIMATE

- ABOUT 20 TO 25% OF IRAQI WEAPONRY HAD BEEN DESTROYED (2/21/91)
- CLAIM THE U.S. TAKES CREDIT FOR TARGETS HIT BUT NOT DESTROYED

### RESULTS

- |                                                                                                                                                                                                                                                                                                                                                                   |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <ul style="list-style-type: none"><li>● INCREASE ATTACKS BY NEW METHOD ON 2/19/91 (RELY ON TAC AIR WITH MAVERICK AND HELLSFIRE MISSILES TO GO ONE-ON-ONE) -- HITTING 200 TANKS PER DAY BY 2/21/91<sup>119</sup></li><li>● DELAY GROUND OFFENSIVE BY A FEW DAYS (2/21/91 TO 2/24/91) -- WHILE STUDYING SOVIET PEACE PROPOSALS AND MAKING DECEPTIVE MOVES</li></ul> |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|



## COMMENTS ON HELICOPTER OPERATIONS

### EARLY MISSIONS (1/16/91 TO 2/18/91)

- CONTINUOUS LOW SORTIE LEVELS TO ATTACK EXPOSED TANKS, APCs, AND ARTILLERY ALONG THE FRONT USING COBRAS AND APACHES
- MONITOR IRAQI FORCE MOVEMENTS AND STATUS
- TRANSPORT FORCES AND SUPPLIES TO FORWARD DEPLOYMENTS
- LEVEL OF ACTIVITY ABOUT 50 TO 100 SORTIES PER DAY

### SURGE SUPPORT FOR GROUND WAR

- HEAVY ATTACKS TO ATTRIT IRAQI ARMOR (2/18/91 TO 2/22/91)<sup>83</sup>
- DECEPTIVE MOVES AND TARGET STRIKES IN AND AROUND KUWAIT CITY (2/18/91 TO 2/22/91)<sup>83</sup>
- LOWER ACTIVITY ON 2/23/91 TO PREPARE FOR GROUND ATTACK
- MASSIVE TRANSPORT OF TROOPS, FUEL AND SUPPLIES 50 MILES BEHIND IRAQI LINES (CH-47s) (2/24/91 TO 2/27/91)
- CONSTANT GROUND SUPPORT (COBRAS & APACHES) (2/24/91 TO 2/27/91)
- EXCEEDED 800 SORTIES PER DAY DURING BOTH WAVES OF ACTIVITY

### HELICOPTER BASING

- EMPLOYED UP TO 1000 HARD PADS CONSTRUCTED 11/15/90 TO 1/15/91
- SET UP FORWARD FUEL DEPOTS WITH RUBBER BLADDERS BEHIND IRAQI LINES
- ABOUT 40 RAN SHORT OF FUEL BEFORE REACHING HOME (2/25/91 TO 2/27/91)

## SUMMARY OF SCUD LAUNCH SITE ATTACKS



### SILKWORM ANTI-SHIP MISSILE BATTERIES

- Attacked on 1/27<sup>68</sup> and 2 launchers hit 2/5<sup>40</sup>
- Fired 2 missiles at U.S. Persian Gulf fleet on 2/26<sup>72</sup>

SCUD LAUNCHER DATA BASE ~ 100<sup>48</sup> to 140<sup>29</sup>

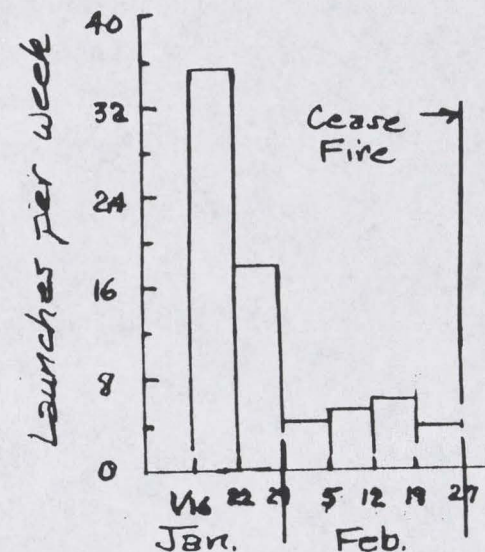
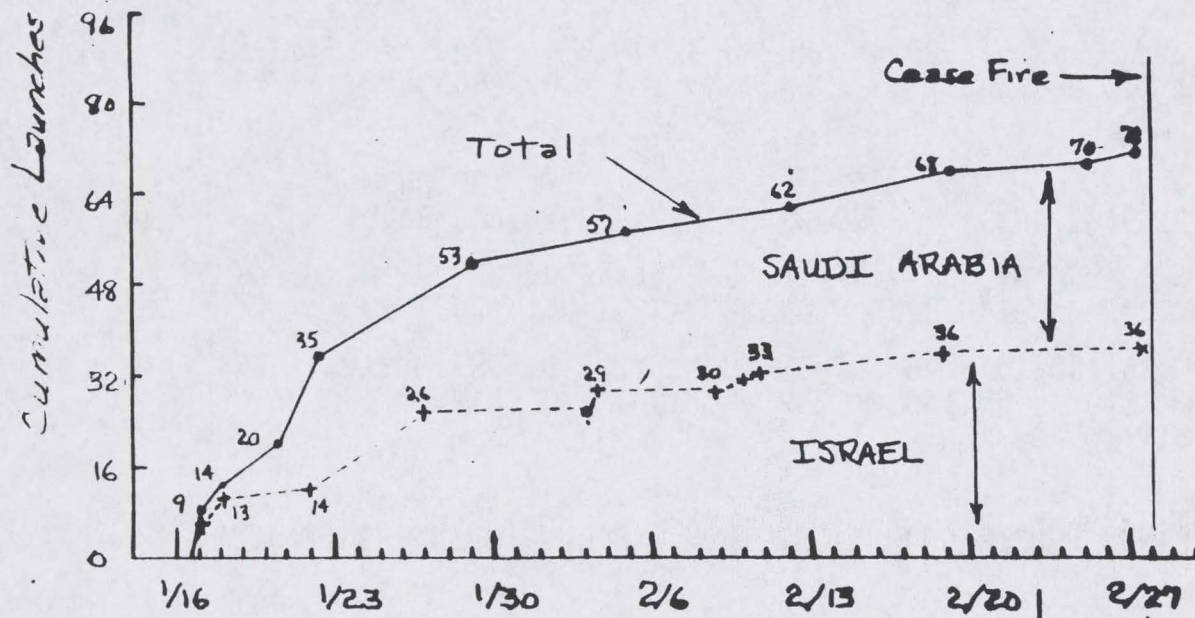
- Fixed Launchers --- 30<sup>48</sup>
- Mobile Launchers --- 70<sup>48</sup> or more
- ~ 300 Modified SCUDs<sup>100</sup> plus 200 SCUD-Bs<sup>11</sup>

| Dates & Sources                | Fixed Destroyed                             | Mobile Destroyed    | Cum. Sorties                | Sorties per Launcher |
|--------------------------------|---------------------------------------------|---------------------|-----------------------------|----------------------|
| 1/20<br>(4 days) <sup>29</sup> | unknown                                     | 16                  | unknown                     |                      |
| 1/30<br>(2 weeks)              | 8 <sup>4</sup> to 30 <sup>59</sup><br>(all) | ~ 30 <sup>34</sup>  | 1500 <sup>59</sup>          | < 39                 |
| 2/6<br>(3 weeks)               | 30                                          | some <sup>59</sup>  | 1500 <sup>42</sup><br>(2/4) | ~ 38                 |
| 2/13<br>(4 weeks)              | 30                                          | 35 <sup>67</sup>    | > 3000*                     | ~ 46                 |
| 2/20<br>(5 weeks)              | 30                                          |                     |                             |                      |
| 2/27<br>(6 weeks)              | 39                                          | 15-25 <sup>93</sup> | ~ 4000 est                  | ~ 73                 |

\*Gen. Schwarzkopf announced 1500 more sorties diverted from strategic targets to hunt SCUDs from 1/30<sup>59</sup> to 2/10<sup>13</sup> --- Error in early success<sup>23</sup>



# SCUD MISSILE LAUNCHES AT ISRAEL & SAUDI ARABIA



| Period<br>Dates | SCUD Launches  |                      |               |
|-----------------|----------------|----------------------|---------------|
|                 | Against Israel | Against Saudi Arabia | Total         |
| 1/16-1/22       | 13             | 22                   | 35            |
| 1/23-1/29       | 13             | 5                    | 18            |
| 1/30-2/5        | 4              | 0                    | 4             |
| 2/6-2/12        | 2              | 3                    | 5             |
| 2/13-2/19       | 3              | 3                    | 6             |
| 2/20-2/27       | <del>21</del>  | <del>13</del>        | <del>34</del> |
| Total           | 36             | 36                   | 72            |

- First Patriot kill of SCUD over Israel on 1/24<sup>15</sup>
- 21 of 28 engaged over Saudi Arabia by 2/6<sup>19</sup>
- One of missiles shot down over Israel was ~~solid~~ propellant booster (reported by CNN ~2/6)
- New "Shale Stone (Hijara al Sijil) missile fired at Dimona, Israeli Nuclear reactor on 2/18. 120

## COMMENTS CONCERNING SCUD MISSILE LAUNCHER ATTACKS

- ATTACKS VERSUS KNOWN FIXED AND MOBILE LAUNCHER SITES STARTED ON FIRST DAY, 1/17/91
  - EARLY REPORTS OF SUCCESSFUL DESTRUCTION OF FIXED LAUNCHERS WERE OVERLY OPTIMISTIC
  - NO EVIDENCE THAT LAUNCHERS WERE HIDING IN POPULATED AREAS BY 1/19/91<sup>30</sup>
- SOME SCUDs HIDDEN IN HANGARETTES, GARAGES, AND UNDERGROUND SHELTERS REPORTED DURING SECOND WEEK
- IRAQIS USED NIGHT AND BAD WEATHER (CLOUDS/STORM FRONTS) TO PREPARE MISSILES FOR LAUNCH -- NY TIMES
- 90-SECOND WARNING OF SCUD LAUNCHERS PROVIDED BY U.S. DEFENSE SUPPORT PROGRAM (DSP) SATELLITES TO ISRAELI AND SAUDI PATRIOT UNITS<sup>100</sup>
  - AT LEAST TWO GEOSYNCHRONOUS SATELLITES IN EQUATORIAL ORBITS 2,700 MILES SOUTH OF IRAQ OVER INDIAN OCEAN
  - GAVE COVERAGE EVERY 12 SECONDS -- SCUD FLIGHT TIME WAS ABOUT SEVEN MINUTES
- SEARCH FOR SCUD LAUNCHERS OVER HOSTILE TERRITORY WAS BEST DONE BY STEALTH AIRCRAFT -- F-117 NEED LONGER ENDURANCE<sup>99</sup>



## SUMMARY OF BRIDGE ATTACKS



### OBJECTIVES

- Cut road and rail transport south
- Prevent transport & communications in Baghdad area

### BRIDGE DATA BASE --- USD Total

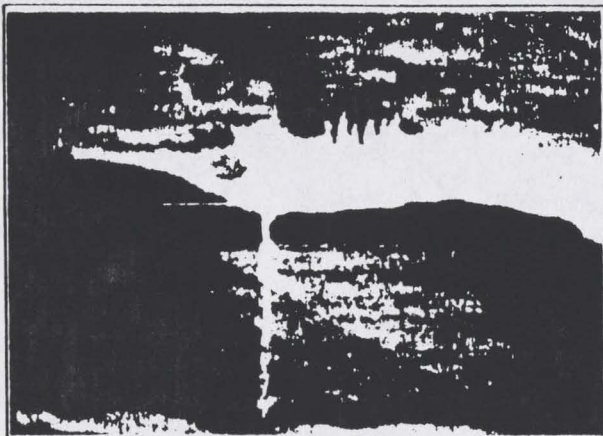
- 35 between Baghdad and Kuwait
- 12 in city of Baghdad
- 3 in Kuwait

| Dates & Sources                    | Bridges Attacked               | Bridges Destroyed | Cum. Sorties      | Sorties per Bridge |
|------------------------------------|--------------------------------|-------------------|-------------------|--------------------|
| 1/16 - 1/22                        | Not attacked during first week |                   |                   |                    |
| 1/22-V <sup>30</sup><br>(2nd week) | 33 <sup>59</sup>               | 25 <sup>41</sup>  | 790 <sup>59</sup> | 24 <sup>59</sup>   |
| by 2/4                             | 35 <sup>60</sup>               | 25 <sup>60</sup>  | ?                 | ?                  |
| by 2/13                            | 42 <sup>51x</sup>              | 27 <sup>39</sup>  | ?                 | ?                  |

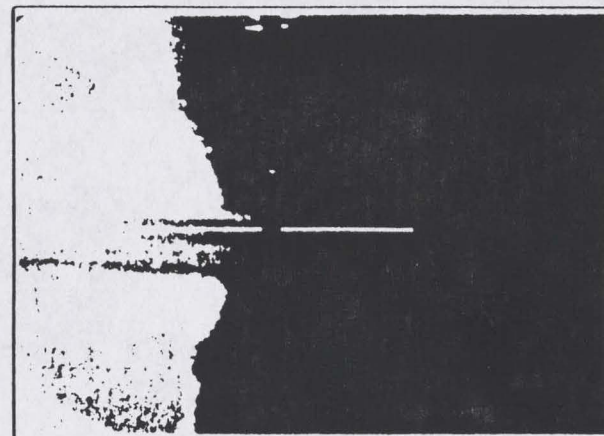
\* Included 35 highway and 7 railroad bridges<sup>70</sup>

Estimated that supplies to the south cut by 90 percent due to bridge bombing by 2/22<sup>98</sup>

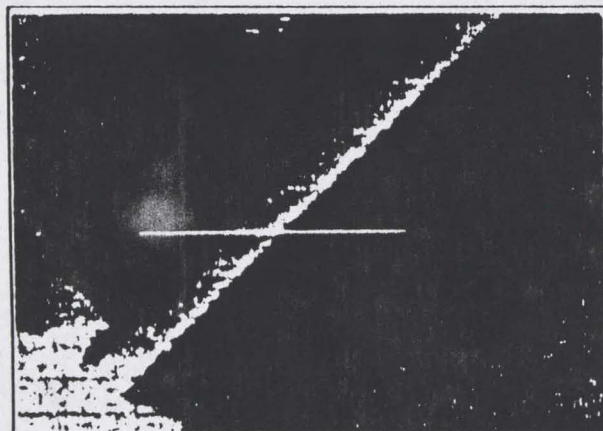
BRIDGES HIT BY LASER GUIDED I-2000 BOMBS



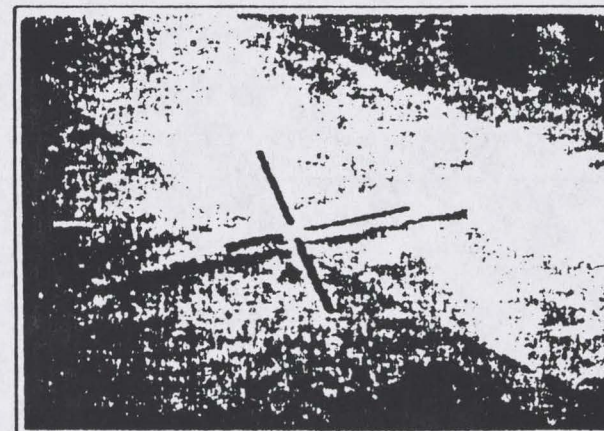
SAMAWAH RAILROAD BRIDGE -- HIT AT  
BOTH ENDS (DESTROYED)



AL MADINAH HIGHWAY BRIDGE --  
DESTROYED 1/30



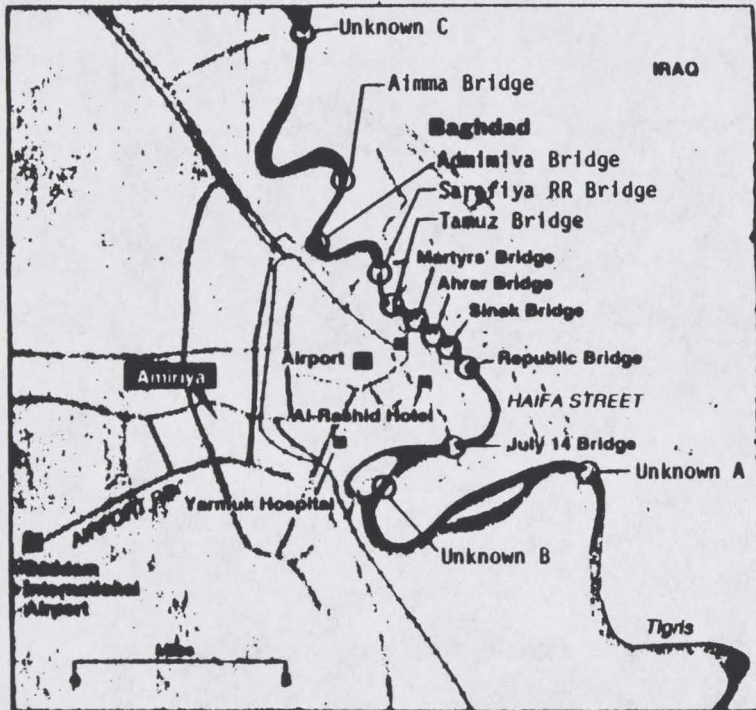
MUFTULWADAM HIGHWAY BRIDGE



AL KIFL HIGHWAY BRIDGE



## BRIDGES DESTROYED IN BAGHDAD - I



| <u>BRIDGES (12 TOTAL<sup>73</sup>)</u> | <u>ATTACKED BY</u>              | <u>RESULT</u>        |
|----------------------------------------|---------------------------------|----------------------|
| 1. AIMMA                               | ?                               | ?                    |
| 2. ADMIMIVA                            | 2/8/91 <sup>63</sup>            | MISSED <sup>63</sup> |
| 3. SARAFIYA (RR)                       | ?                               | ?                    |
| 4. TAMUZ                               | ?                               | ?                    |
| 5. SHUHADA OR MARTYRS'                 | 2/11/91 & EARLIER <sup>65</sup> | DESTROYED            |
| 6. AHRAR*                              | HIT ~2/18/91                    | DAMAGED              |
| 7. SINAK*                              | NOT ATTACKED <sup>67</sup>      |                      |
| 8. JUMBURIYA OR REPUBLIC*              | F-117 ON 2/6/91 <sup>67</sup>   | DESTROYED            |
| 9. JULY 14th                           | 2/13/91 <sup>66</sup>           | DESTROYED            |
| 10. UNKNOWN A                          | ?                               | ?                    |
| 11. UNKNOWN B (MOUALAK?)               | 2/18/91                         | DESTROYED            |
| 12. UNKNOWN C                          | ?                               | ?                    |

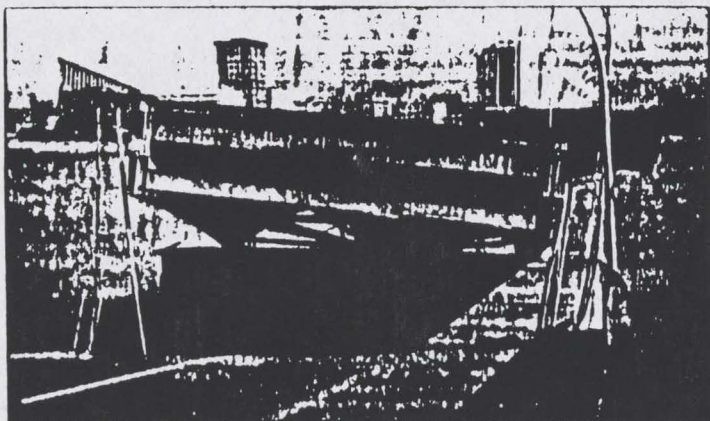
● BRITISH DESTROYED A PONTOON BRIDGE HURRIDLY BUILT ACROSS THE EUPHRATES RIVER ON 2/11/91 -- 12 BOMBS DROPPED BY SEVERAL SORTIES<sup>65</sup>

● BRITISH DESTROYED A BRIDGE IN FALLOUJA ON 2/13/91 WITH LASER GUIDED BOMBS<sup>115</sup>

\*THREE BRIDGES CARRIED FIBRE OPTIC COMMUNICATIONS CABLES<sup>67, 33</sup> -- TWO ORDERED NOT TO BE HIT DUE TO POTENTIAL COLLATERAL DAMAGE AFTER 2/14/91. FOUR DESTROYED BY 2/18/91 .



BRIDGES DESTROYED IN BAGHDAD - II



MOUALAK BRIDGE - HIT ON 2/20/91



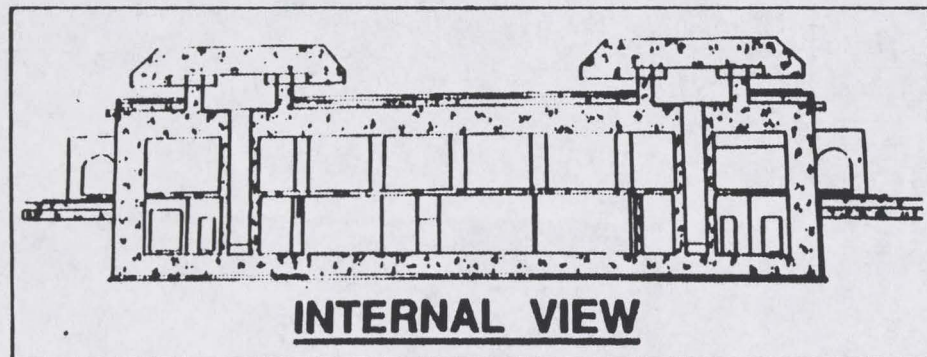
BRIDGE HIT ON 2/5/91



BRIDGE HIT ON 2/24/91



## BUNKERS ATTACKED IN BAGHDAD



### CHARACTERISTICS

- TEN-FOOT THICK REINFORCED CONCRETE ROOF
- ROOF LINED WITH STEEL SHEETS
- SOPHISTICATED COMMUNICATIONS EQUIPMENT, HARDENED AGAINST EMP<sup>67</sup>
- BARBED WIRE AND SECURITY FENCE
- CAMOUFLAGE PAINT
- HOUSED ~400 PERSONNEL (UP TO 1,000 SHELTERED BEFORE ATTACK)<sup>67</sup>

### TARGET DATA BASE -- 25 TOTAL<sup>67</sup>

- BUILT DURING IRAN-IRAQ WAR (1980-1988)
  - 5 SIMILAR TO THAT SHOWN
  - 10 CONVERTED TO C<sup>3</sup> OPERATIONS IN 1989 BY SCANDINAVIAN CONTRACTOR<sup>67</sup>

### ATTACKS

- HALF OF BUNKERS DESTROYED OR SEVERELY DAMAGED BY 2/14/91<sup>67</sup>
- HIT BY F-117s (CEP ~20 FEET)<sup>67</sup>
- RESULT OF COLLATERAL DAMAGE:
  - UP TO 100 TARGETS REMOVED FROM LIST<sup>113</sup>
  - TWO BRIDGES REMOVED FROM ATTACK ON 2/14/91<sup>67</sup>

## NAVAL SORTIES AND ENGAGEMENTS



### PRIMARY TARGETS

#### ● PORT FACILITIES

- BASRA AND UMM QASR, IRAQ
- EL ADAMI AND SHUWAIKH, KUWAIT

#### ● IRAQI NAVAL FORCES: 90 TO 105\*

- 5 FRIGATES
- 38 PATROL CRAFT
- 8 MISSILE CRAFT
- 15 TO 30 OTHER INCLUDING CAPTURED KUWAITI CRAFT
- 6 TORPEDO CRAFT
- 8 MINEWARFARE CRAFT
- 20 INSHORE PATROL CRAFT

#### ● TACTICAL TARGETS AND GROUND SUPPORT IN KUWAIT

| DATES & SOURCES                         | CUMMULATIVE SORTIES FROM CARRIERS | SHIPS DESTROYED | ISLANDS CAPTURED |
|-----------------------------------------|-----------------------------------|-----------------|------------------|
| 1-16 TO 1-30<br>(2 WEEKS) <sup>59</sup> | 3500                              | 46              |                  |

\*SOURCE: MILITARY BALANCE



## U.S. NATO ALLIED AIR-ORDER-OF-BATTLE REFERENCES

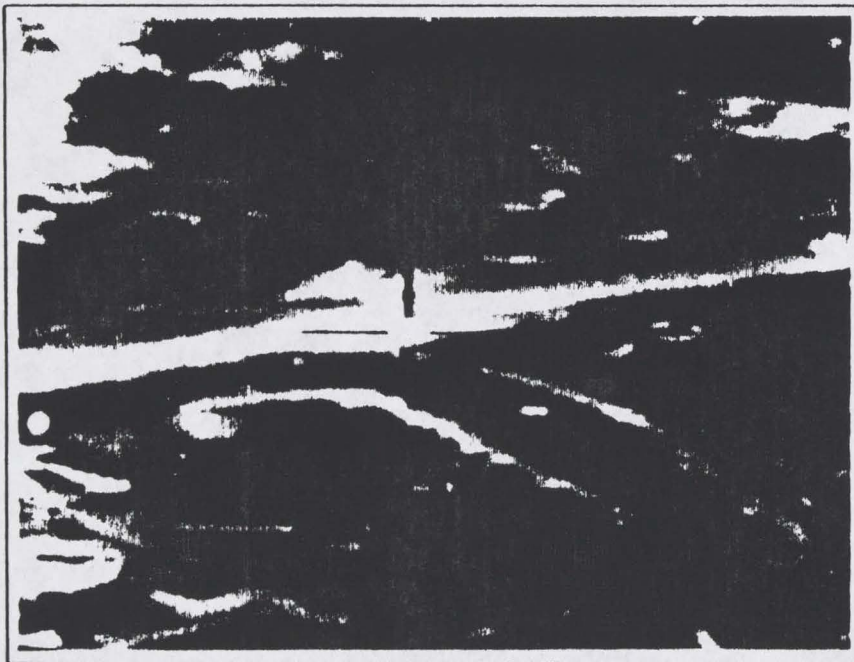
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AL-HUSSEIN MISSILES DESTROYED AT H-2 AIRFIELD

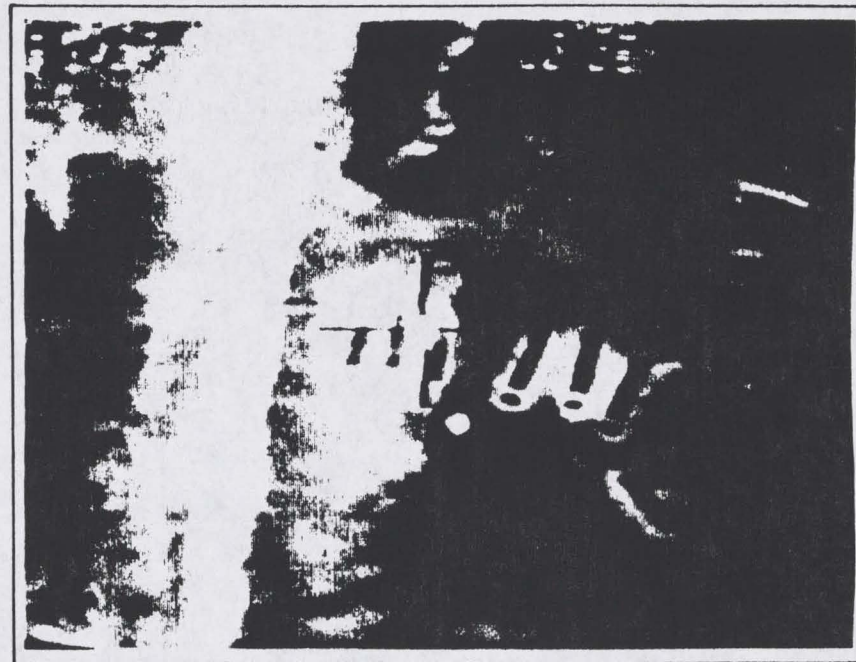


MAIN ROAD SOUTH OF AIRFIELD

- CROSS-HAIRS ON LOCATION OF 11 TRANSPORTER-LAUNCHER
- BUILDING AT LOWER LEFT ARE MISSILE SUPPORT FACILITIES

ATTACK DATE: 25 JANUARY 1990

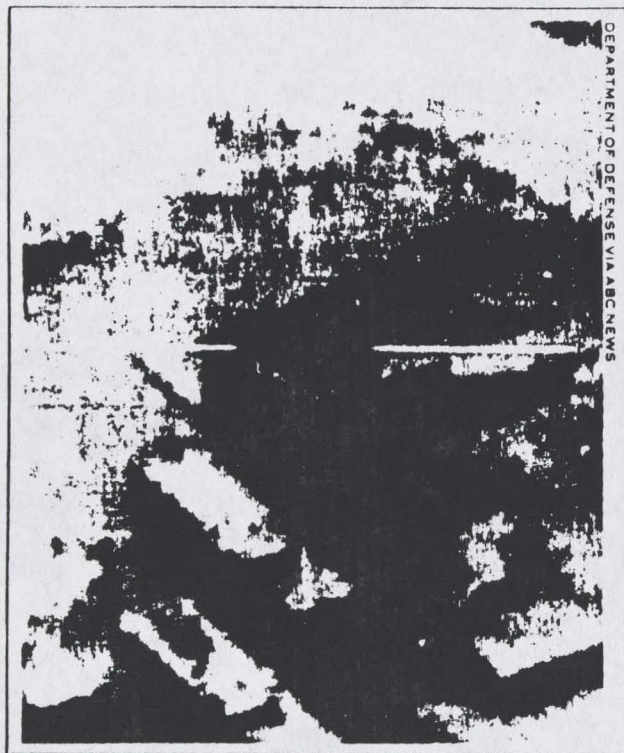
\* TIME: 0800 AM



PILOT CIRCLED CROSS-HAIRS AT LOCATION OF TRANSPORTER LAUNCHERS

- EIGHT TELS CLEARLY VISIBLE
- CLUSTER BOMB PLACED NEAR CROSS-HAIRS -- OBLITERATED THE AREA FROM VIEW

## AIR FORCE HEADQUARTERS & AIR DEFENSE BUNKER



TWO VIEWS OF BOMB HIT ON  
1 JANUARY 1991



### ATTACK NOTES

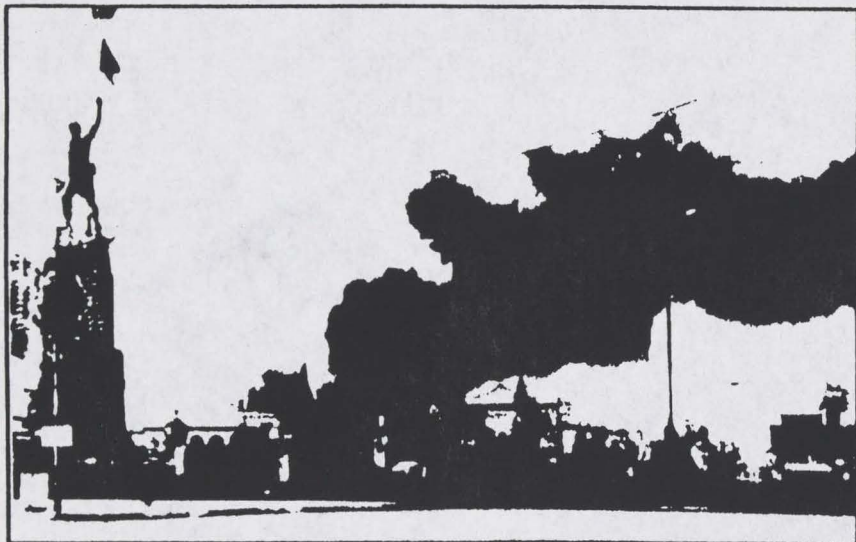
- F-117 STEALTH FIGHTER
- 2,000 LB. I-2000 BOMB
  - LASER-GUIDED
  - HIT AIR SHAFT
- BLEW OPEN THE UPPER STORIES OF MULTISTORY COMMAND CENTER

### UNDERGROUND FACILITIES

- PROBABLY NOT DAMAGED BY ATTACK
- AIR DEFENSE C<sup>3</sup> CENTER
  - RADIO LINKS PROBABLY DAMAGED
  - HARD-WIRE LINKS NOT DAMAGED

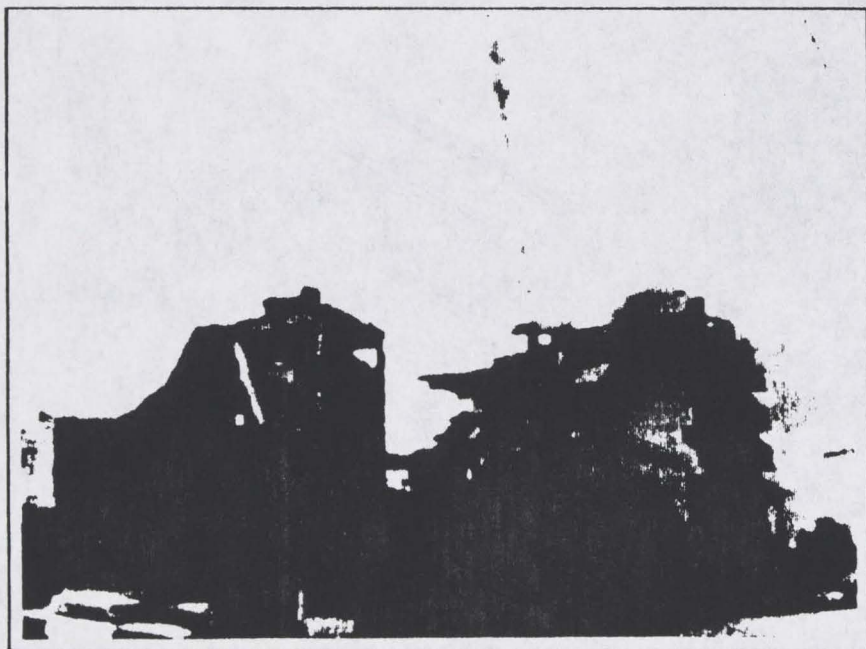


## OTHER KEY TARGETS HIT ON 17 JANUARY 1991



### MINISTRY OF DEFENSE

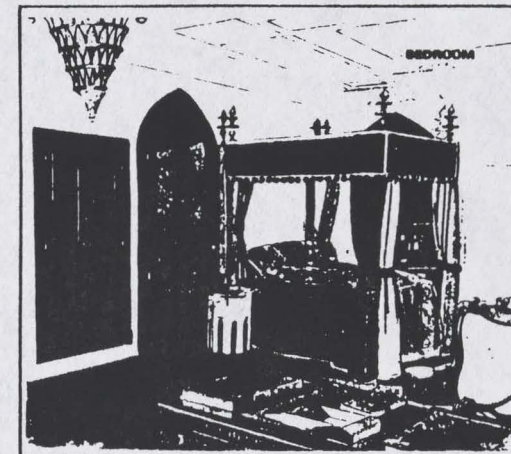
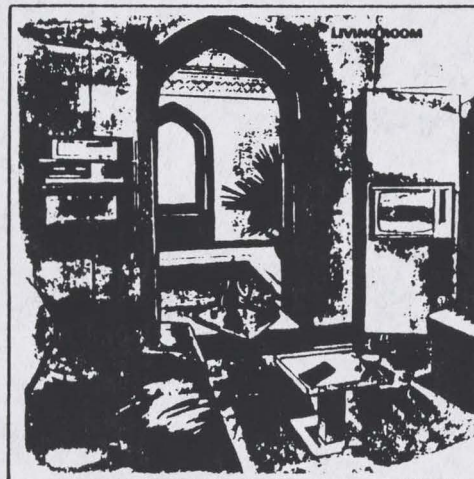
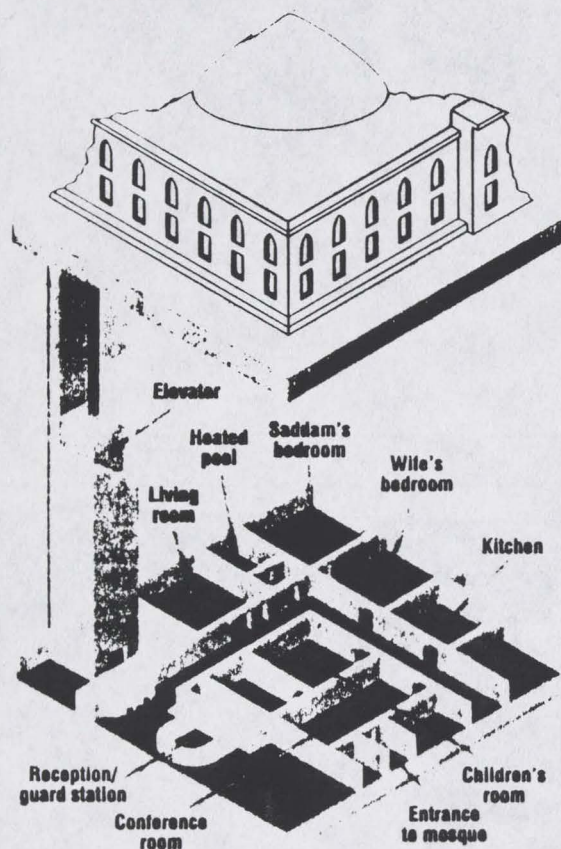
- HIT BY F-117 WITH LASER-GUIDED I-2000 BOMB
- FIRE INITIATED BY ATTACK BURNED FOR MORE THAN 12 HOURS
- EXTENT OF DAMAGE UNKNOWN



### AT&T BUILDING NEAR TIGRIS

- INTERNATIONAL COMMUNICATIONS CENTER USED BY IRAQI MILITARY
- HIT BY F-117 WITH LASER-GUIDED I-200 BOMB
- COMMUNICATIONS TOWER BADLY DAMAGED AND THIRD TO FIFTH FLOORS OF BUILDING DEMOLISHED
- STREET-LEVEL FLOOR AND SHOPS WERE UNUSABLE
- ALL COMMUNICATIONS STOPPED

## UNDERGROUND BUNKER IN SADDAM HUSSEIN'S PALACE



### CONSTRUCTION FEATURES

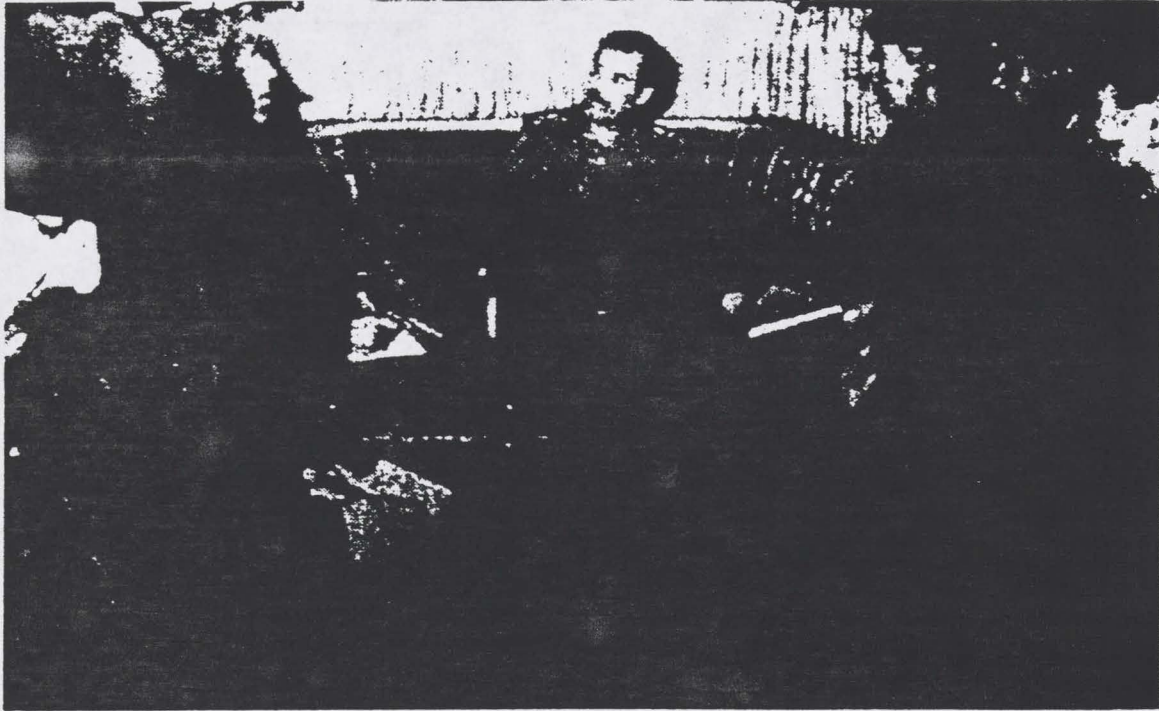
- 50 FEET BELOW GUEST HOUSE AT PRESIDENTIAL PALACE
- ENTRANCE: THREE-TON STEEL DOOR
- WALLS: SIX FEET THICK CONCRETE, LEAD-LINED
- HOUSE 25 PEOPLE WITH ONE-YEAR SUPPLIES
- SITUATION ROOM & RADIO BROADCAST STUDIO
  - 24 TV SCREENS
  - COMMUNICATIONS HARD-WIRE LINKS TO AIR DEFENSE AND PRESIDENTIAL COMPOUND
- LAVISHLY DECORATED 12-ROOM COMPLEX
  - COST \$65 MILLION

SOURCE: BILD AM SONNTAG  
NEWSWEEK, 4 FEB. 1991, PG. 41

PALACE HIT BY A TLAM-C  
TOMAHAWK ON 1/17/91 --  
EXTENT OF DAMAGE UNKNOWN



## OTHER IRAQI UNDERGROUND BUNKERS



Agence France-Presse

### HUSSEIN IN PALACE CONFERENCE ROOM

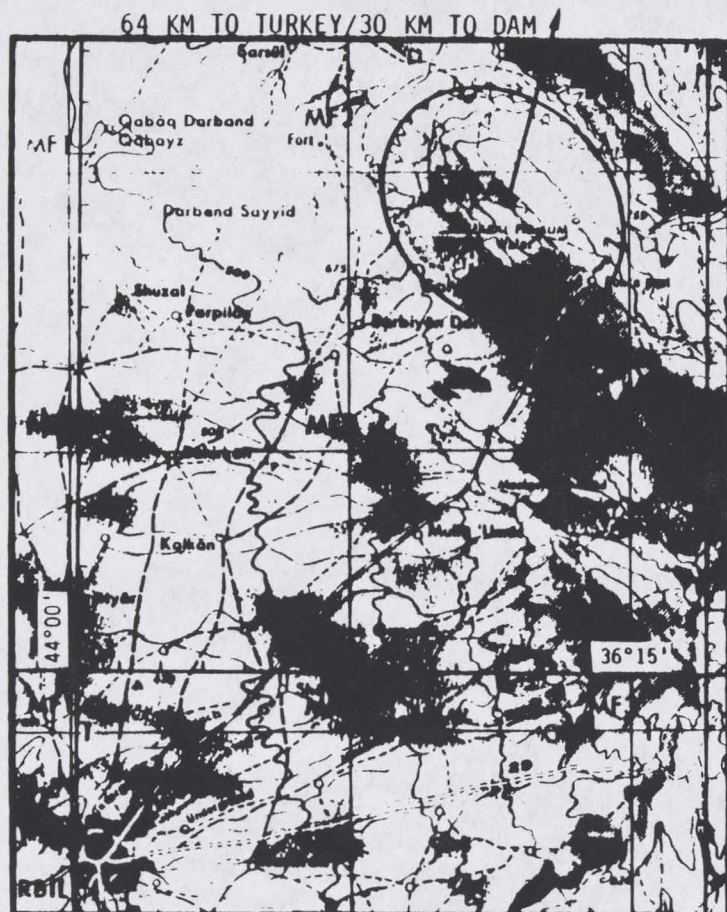
- PHOTO AND VIDEO RELEASED TO JORDANIAN NEWSPAPER AFTER 17 JANUARY 1991
- NOTE PLUSH SEATS AND PADDED WALLS
- CEILING OF ROOM IS CONCRETE ARCH



- CENTER LOCATED IN NORTHERN KUWAIT -- MAY HAVE BEEN DESTROYED
- INTERNAL WALLS WERE ROUGH CONCRETE WITH TIMBERS AND SLAB ROOF
- ROOM CONTAINED HARD-WIRE TELEPHONE AND RADIO C<sup>3</sup> LINKS
- DATE: EARLY JANUARY 1991



## NOVEMBER 1990 REPORT OF UNDERGROUND NUCLEAR FACILITY\*



### LOCATION

- GARA MOUNTAINS -- SOUTHWESTERN SLOPES
- 64 KM SOUTH OF TURKISH BORDER
- APPARENTLY NEAR 36°24'N, 44°11'E

### NOTED FACILITIES

- EXCAVATIONS AT TWO SITES
  - ONE IS URANIUM MINE (H. ZEBARI OF KURDISTAN DEMOCRATIC PARTY)
  - SECOND IS HIGH TUNNEL DUG INTO MOUNTAIN-SIDE (UNKNOWN PURPOSE)
- NEARBY 750 M-LONG BUILDING
- MASSIVE FORK-SHAPED EMBANKMENTS MADE FROM EXCAVATION MATERIALS
- NEW ACCESS ROAD BUILT DURING 1989
- WORK CREWS ROTATED EVERY 30 DAYS FOR SECURITY OR RADIATION DOSE REASONS (H. ZEBARI, KDP)

### SPECULATION

- SITE OF URANIUM ORE PROCESSING AND GAS CENTRIFUGE CONCENTRATOR (WEST GERMAN)
- HYDROELECTRIC POWER FROM DAM AT BAKHMA (36°42'N, 44°15'E) -- 30 KM NORTH
- MAY BE CHEMICAL WEAPON PRODUCTION FACILITY

\*"Satellite Reveals Uranium Mine," Jane's Defense Weekly, 3 November 1990, pg. 879. Based on Soviet Soyuz Mark 4 camera photo reviewed by J. Moore of UK, National Imagery Center (NIAC), Cambridge.



URANIUM MINE & ENRICHMENT SITE: GARA MOUNTAINS - I

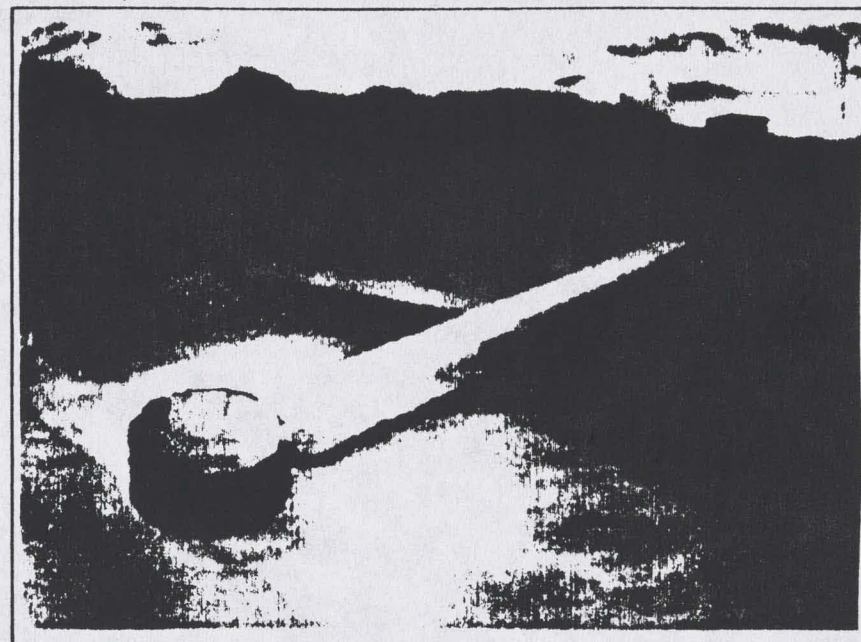


THREE-DIMENSIONAL RECONSTRUCTION OF SITE AREA BY BRITISH, UNIVERSITY COLLEGE,  
LONDON (CBS "60 MINUTES" REPORT)

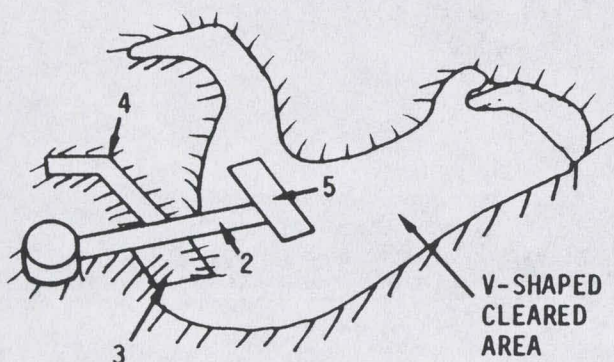
- BASED ON SOVIET SATELLITE IMAGES TAKEN IN AUGUST 1990
- LEFT PICTURE SHOWS 50 SQUARE MILE AREA CONTAINING TWO POSSIBLE MINE SITES
- ACCESS ROAD WINDS ALONG RIDGE TO SITE IN CENTER OF RIGHT-HAND PICTURE



## URANIUM MINE & ENRICHMENT SITE: GARA MOUNTAINS - II



BRITISH, NATIONAL IMAGE ANALYSIS CENTER,  
CAMBRIDGE, ATTEMPT TO DEFINE STRUCTURES



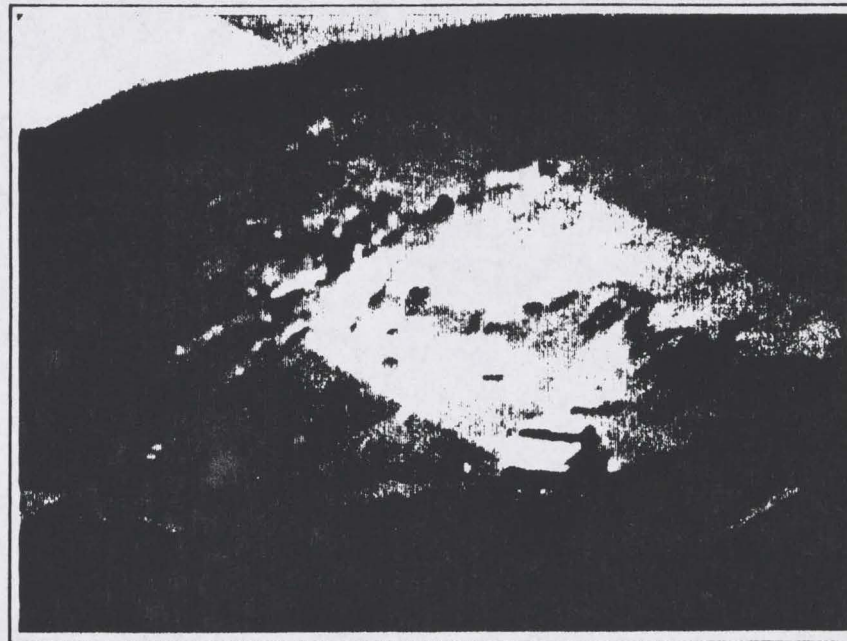
1. CIRCULAR TANK -- WATER?
2. 750 m-LONG MAIN BUILDING, 2 TO 3 STORIES HIGH -- ENRICHMENT FACILITY
3. THREE EARTH-COVERED ENTRANCES
4. MAIN TUNNEL INTO MOUNTAIN
5. ADMINISTRATION AND CREW QUARTERS



URANIUM MINE & ENRICHMENT SITE: GARA MOUNTAINS - III

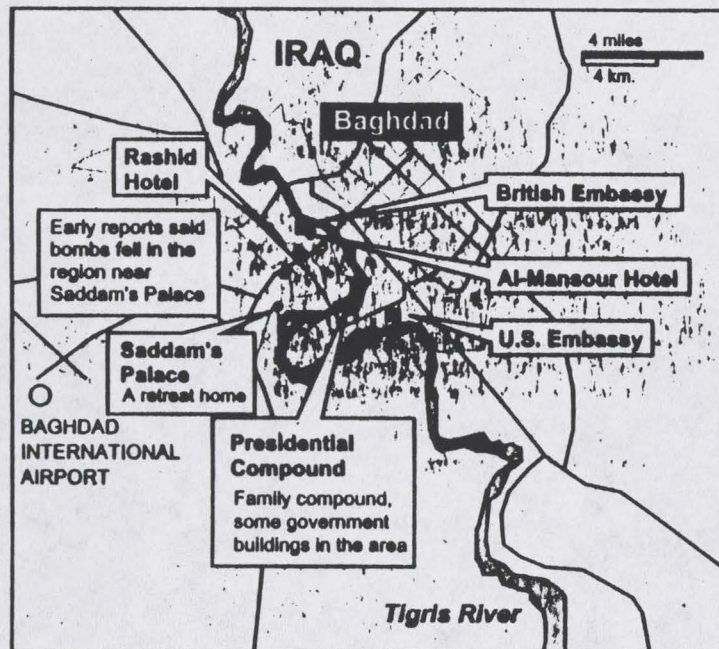


SADDAM HUSSEIN AT TUNNEL ENTRANCE DURING ONE OF 7 OR 8 VISITS TO SITE DURING 1990. MOUNTAIN AREA IS COMPLETELY SEALED OFF BY SECURITY FORCES.



CARAVAN OF THREE DOZEN CARS ESCORTING SADDAM HUSSEIN DOWN THE MOUNTAIN FROM THE SITE. IRAQI COVER STORY IS THAT A REMOTE PALACE IS BEING CONSTRUCTED.

## PRIMARY UNDERGROUND BUNKERS IN BAGHDAD



### THREE GIANT BUNKERS REPORTED

1. PRESIDENTIAL COMPOUND ON THE EAST BANK OF THE TIGRIS RIVER
2. CLOSE TO AIR FORCE HEADQUARTERS SOUTH OF BAGHDAD'S OLD QUARTER
3. SADDAM HUSSEIN'S PALACE UNDER A GUEST HOUSE

### BACKGROUND

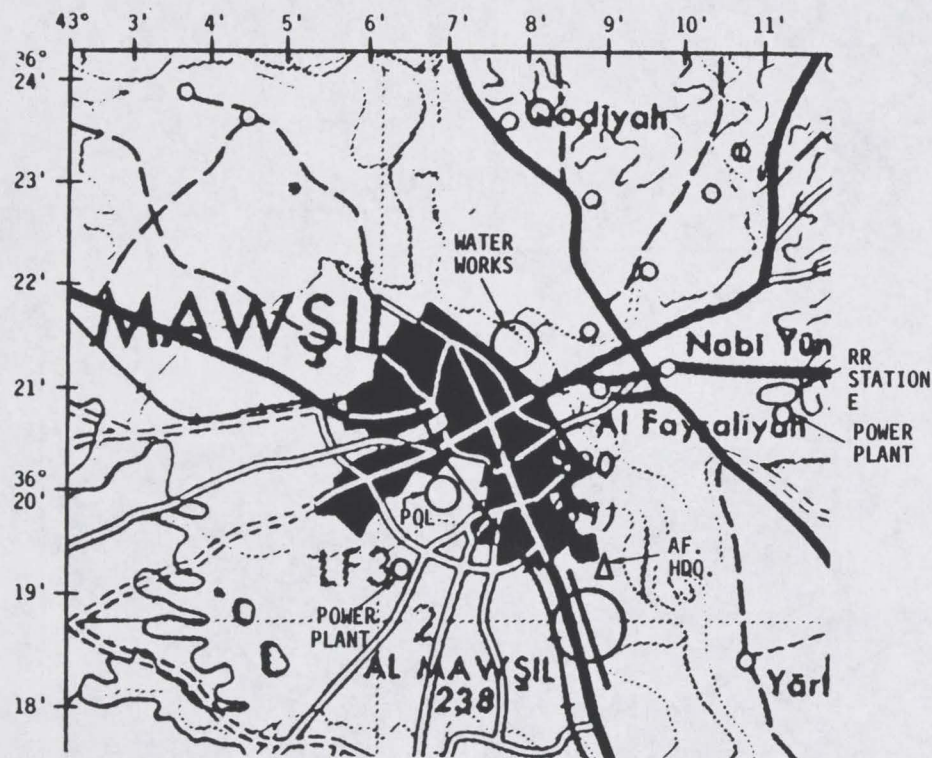
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- PLANS FOR DEVELOPMENT OF BUNKERS STARTED IN 1979
- CONSTRUCTION BEGAN IN 1981 AND WAS COMPLETED BY 1986
- DESIGN AND CONSTRUCTION DONE BY CIVIL ENGINEERING COMPANY FROM DUSSELDORF, WEST GERMANY



## SAAD-16 NUCLEAR RESEARCH CENTER: MOSUL - I



### APPARENT LOCATION

- LATITUDE: UNKNOWN
- LONGITUDE: UNKNOWN

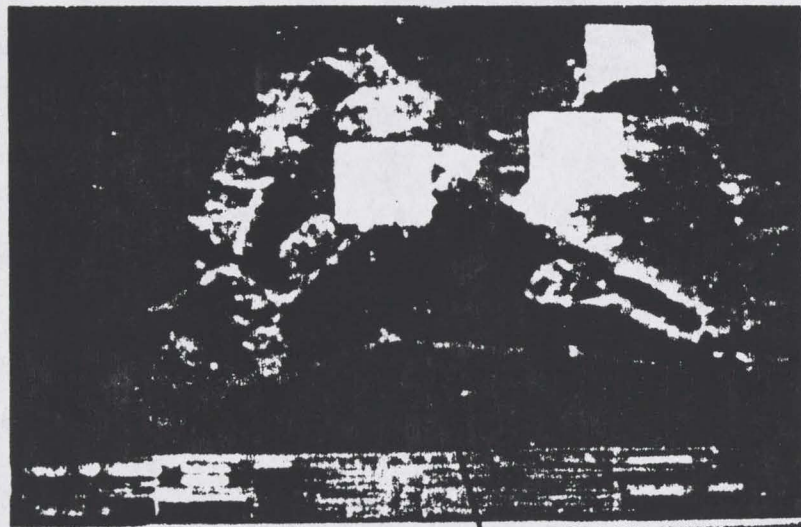


VIEW OF FACILITY FROM CAR WINDOW

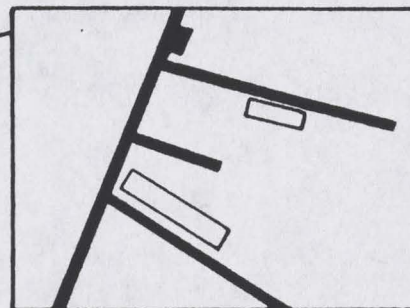
- FACILITY BUILT BY GERMAN COMPANY, GILDEMEISTER PROJECTA, 1985 TO 1990.
  - COVERS HUNDREDS OF ACRES
  - FENCED AND SECURE AREA
- DESIGNS FOR IMPROVED SCUDS WERE PREPARED HERE.
- RESEARCH FOR NUCLEAR REENTRY WARHEADS BEING DONE HERE.

SAAD-16 NUCLEAR RESEARCH CENTER: MOSUL - II

GILDEMEISTER PROJECTA PLANT LAYOUT DRAWING

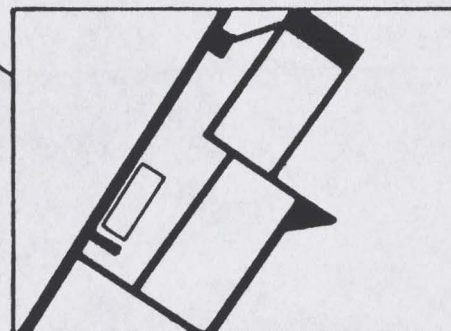


GILDEMEISTER 1

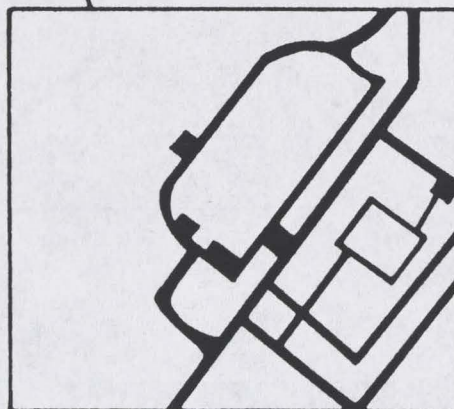


GILDEMEISTER 2

● LOCATION OF  
IMPROVED SCUD  
DESIGN



GILDEMEISTER 3





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(1)

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