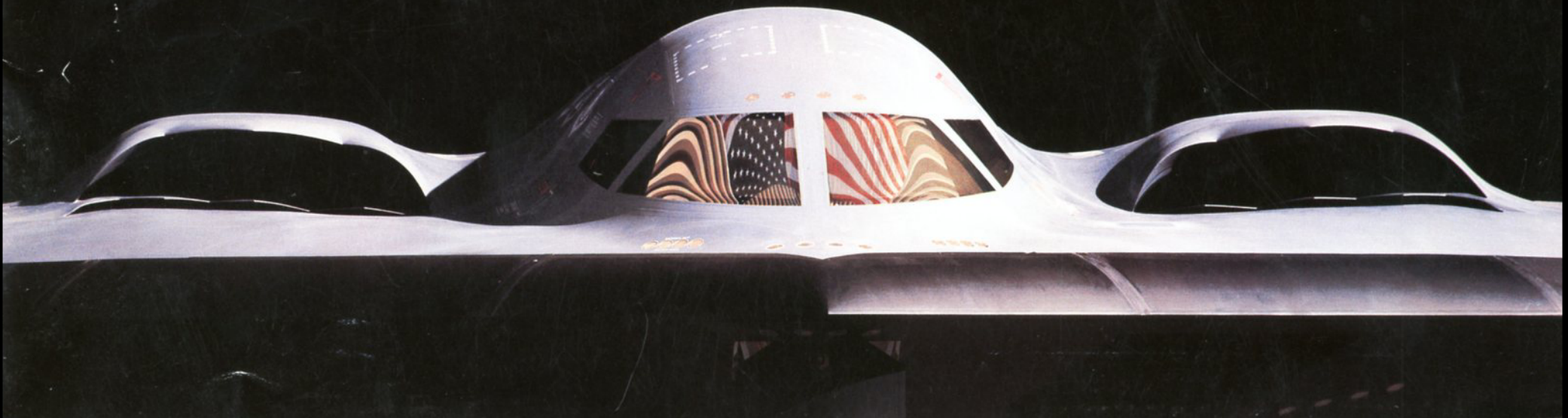


B-2 ADVANCED TECHNOLOGY BOMBER

A Revolution in Deterrence



THE B-2: STRENGTHENING THE SECURITY OF THE U.S. WELL INTO THE 21ST CENTURY

The B-2 Stealth Bomber, with its capability to penetrate enemy air defenses well into the 21st century, is the most important contribution to America's deterrent since the development of the intercontinental ballistic missile.



- Global coverage from U.S. bases (range of 6,000 nautical miles unrefueled or 10,000 nautical miles with one refueling)
- Greater operational reach than any current bomber
- Stealth features allow the B-2 to penetrate the most formidable defenses with virtual impunity, placing far fewer airmen at risk
- Can deliver 50,000 lbs of nuclear or conventional payloads

“(The B-2) combines all the best attributes of a penetrating bomber: long range, efficient cruise, heavy payload, all altitude penetration capability, accurate delivery and reliability and maintainability.”

**General Larry Welch, Chief of Staff
United States Air Force**

THE BOMBER, ICBM AND SLBM TRIAD OF STRATEGIC FORCES IS THE FOUNDATION OF DETERRENCE

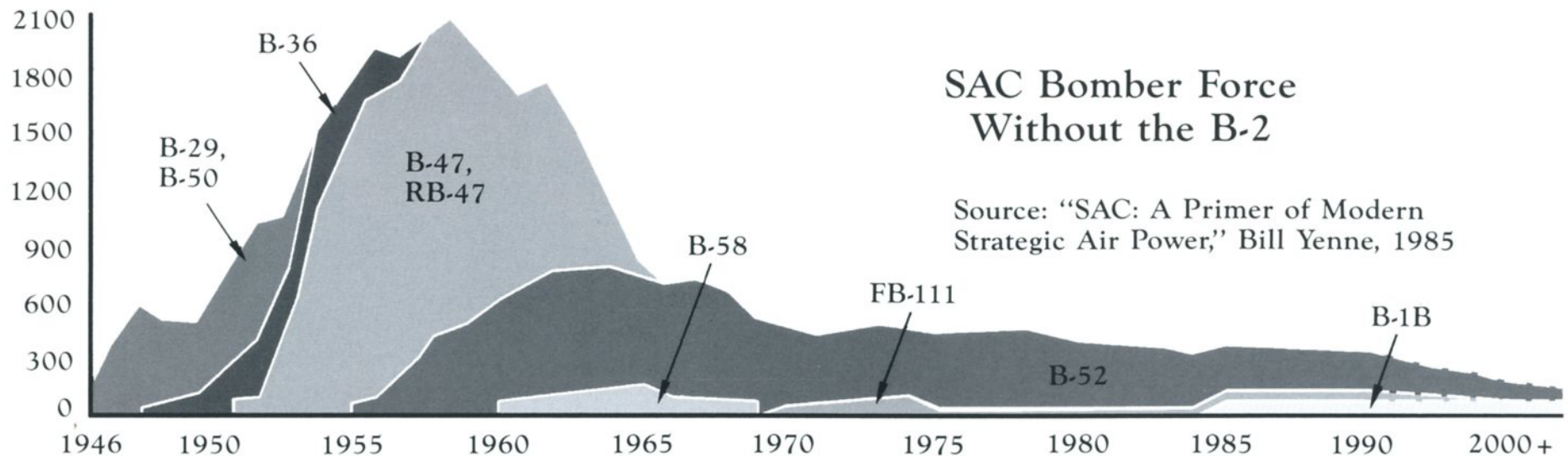
Bomber		ICBM Intercontinental Ballistic Missile		SLBM Submarine Launched Ballistic Missile	
Strengths	Weaknesses	Strengths	Weaknesses	Strengths	Weaknesses
<ul style="list-style-type: none"> ■ Covers All Targets ■ Large Payload ■ Recallable ■ Reusable ■ Human Judgement ■ Stabilizing ■ Most Accurate ■ Non-Nuclear Capability 	<ul style="list-style-type: none"> ■ 8-12 Hour Flight Time ■ Must Penetrate Air Defenses 	<ul style="list-style-type: none"> ■ Prompt Response ■ Accurate ■ Unstoppable 	<ul style="list-style-type: none"> ■ Non-Reusable ■ Non-Recallable ■ Fixed Targets ■ Survivability Depends on Mobile Basing 	<ul style="list-style-type: none"> ■ Prompt Response ■ Survivable ■ Accurate ■ Unstoppable 	<ul style="list-style-type: none"> ■ Non-Reusable ■ Non-Recallable ■ Fixed Targets ■ Difficult Command & Control

- *This policy has been reaffirmed by eight Presidents and fifteen Congresses over more than three decades*
- *Each leg of the triad has complementary strengths and weaknesses*
- *The triad is the best guarantee that a nuclear attack will not be launched against the United States and its allies*

“It (the B-2) is a revolution in combat capability . . . it will do much to preserve the peace for a long time.”

**General John T. Chain, Commander in Chief
Strategic Air Command**

THE B-2 IS ESSENTIAL TO THE FUTURE OF THE U.S. BOMBER FORCE



- The U.S. bomber force continues to erode through age and attrition
- Over time, the U.S. bomber force, without the B-2, will become increasingly vulnerable to improved enemy air defenses

"The goal for the bomber force continues to be roughly 340 modernized nuclear-capable heavy bombers, and that has been the goal since the mid-'70s. The upgraded B-52, more than 27 years old today, will serve well in the cruise missile carrier role for at least another decade. The B-1 can hold most Soviet targets at risk today and, with planned upgrades, will cover many targets for years to come. And the B-2 will provide the long-term capability to most efficiently cover a wide range of targets to include heavily defended targets."

**General Larry Welch, Chief of Staff
United States Air Force**

THE B-2 RENDERS THE SOVIET AIR DEFENSE INVESTMENT OBSOLETE

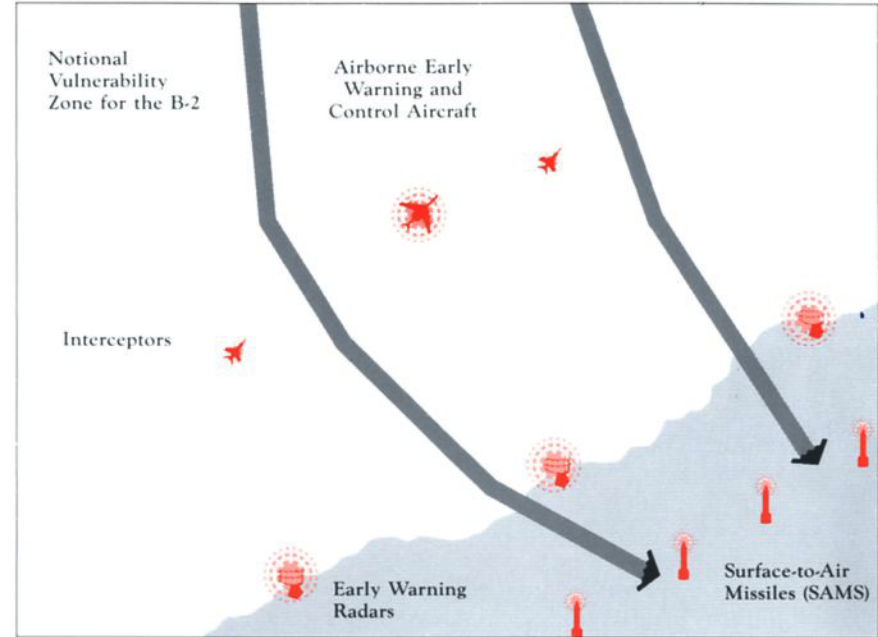
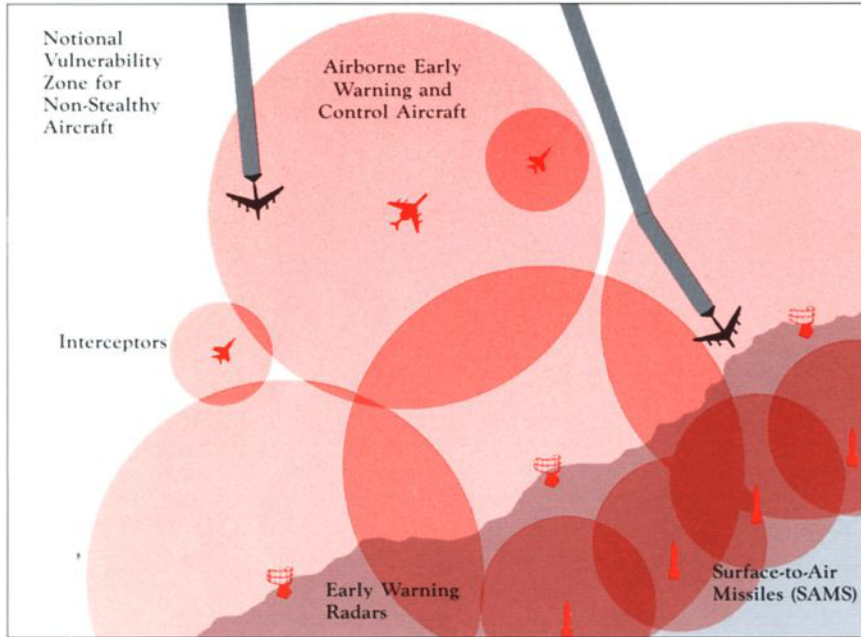
The same is true for the air defenses of the Warsaw Pact, the Soviet navy and the rest of the world.



“(The B-2 is) going to give us so much more return for our money because the Soviets have been building their air defenses for years . . . they have something like \$300 billion or maybe \$400 billion in air defenses. The Stealth Bomber is going to require them to either give up on those air defenses in large or they’re going to have to revamp them. So there’s a huge economic premium here for the Stealth Bomber.”

Sam Nunn
United States Senator

THE B-2's STEALTH CHARACTERISTICS ASSURE PENETRATION OF EXISTING OR PROJECTED AIR DEFENSES



Current bombers rely on initial ICBM and SLBM attacks on Soviet air defenses, electronic countermeasures and low altitude penetration to survive. The B-2 can penetrate at high or low altitude, as appropriate, with virtual impunity, without reliance on any other weapon system.

“The B-2 can penetrate effectively any existing or expected air defense system.”

**General John T. Chain, Commander in Chief
Strategic Air Command**

CRUISE MISSILES CANNOT REPLACE THE PENETRATING BOMBER IN THE TRIAD

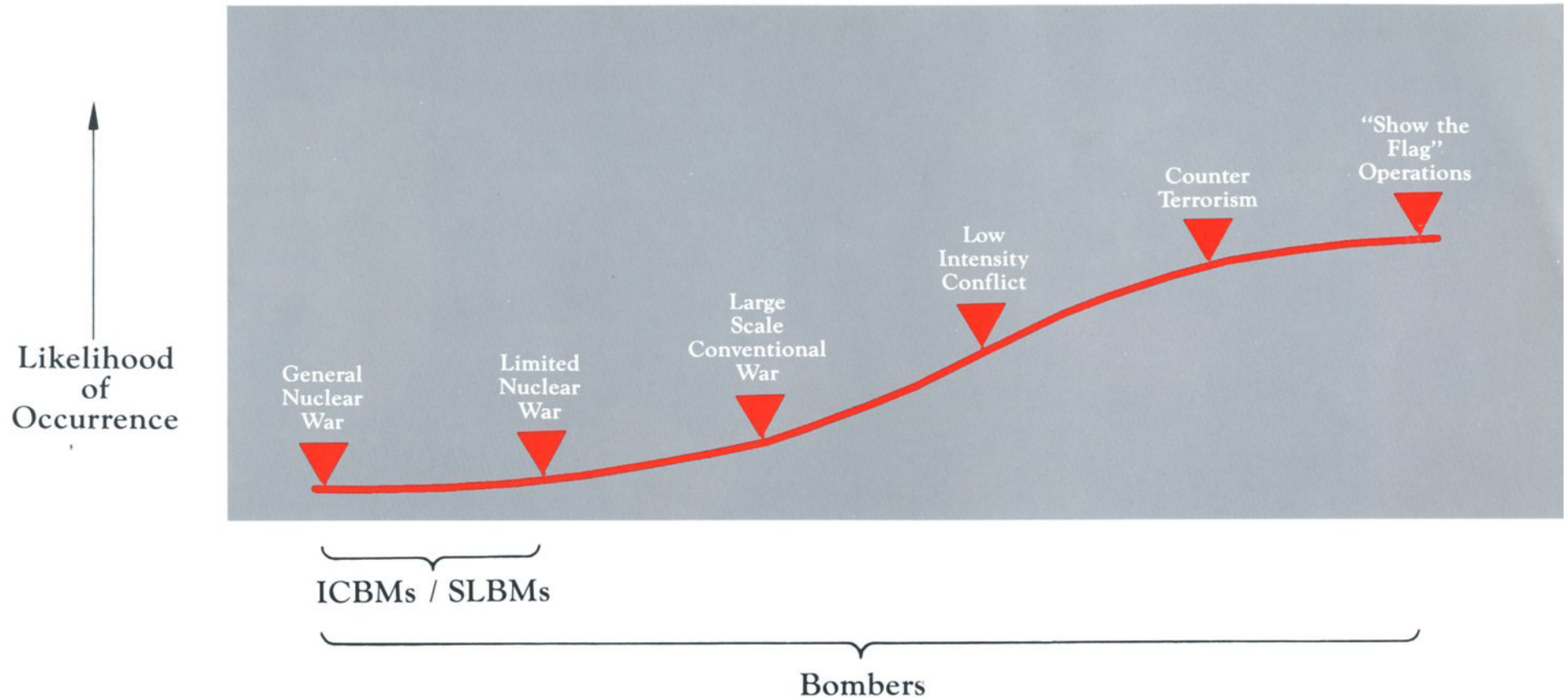
Cruise missile carriers are vulnerable to long range fighters guided by Soviet AWACS

- Only penetrating bombers can:
 - Carry large nuclear weapons
 - Conduct target assessments
 - Economically perform conventional missions
 - Effectively respond to target movement and location uncertainty
- Cruise missiles are more constrained by Strategic Arms Reduction Talks than penetrating bombers



(Notional Depiction)

THE B-2 BOMBER IS EFFECTIVE ACROSS THE SPECTRUM OF CONFLICT



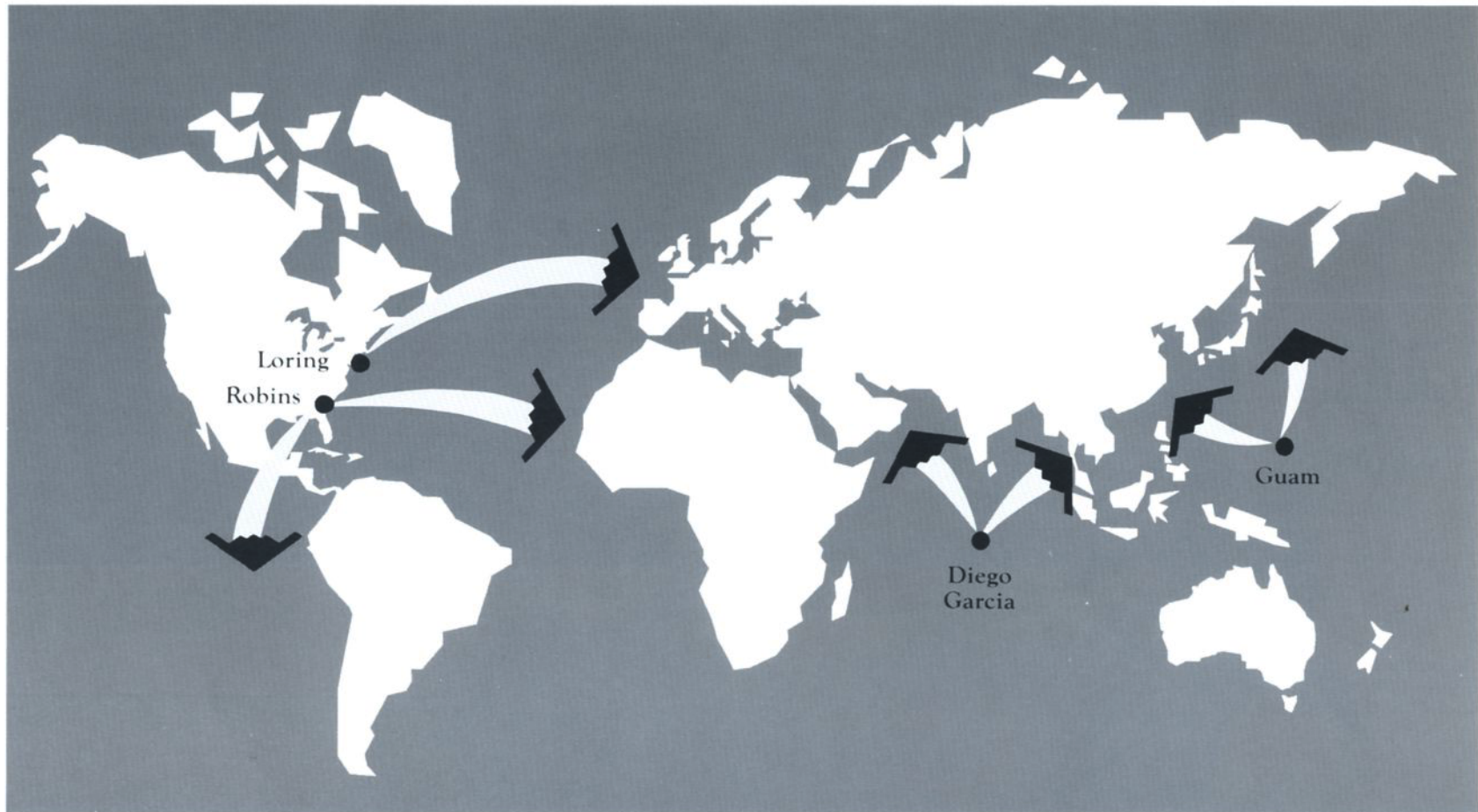
"I think it's important to note that the B-2 offers us a mechanism of deterrence across a wider range of conflict, than I believe any other system."

Donald B. Rice, Secretary of the Air Force

"Bombers are effective throughout the spectrum of conflict including peacetime show of force, small-scale strikes worldwide from bases in the United States, conventional operations in theater, as well as nuclear strikes. Our bombers provide enormous combat capability for our country and the free world."

General John T. Chain, Commander in Chief Strategic Air Command

WITH ONE REFUELING AND A FULL 50,000 POUND PAYLOAD,
THE B-2 CAN COVER THE ENTIRE GLOBE FROM U.S. BASES

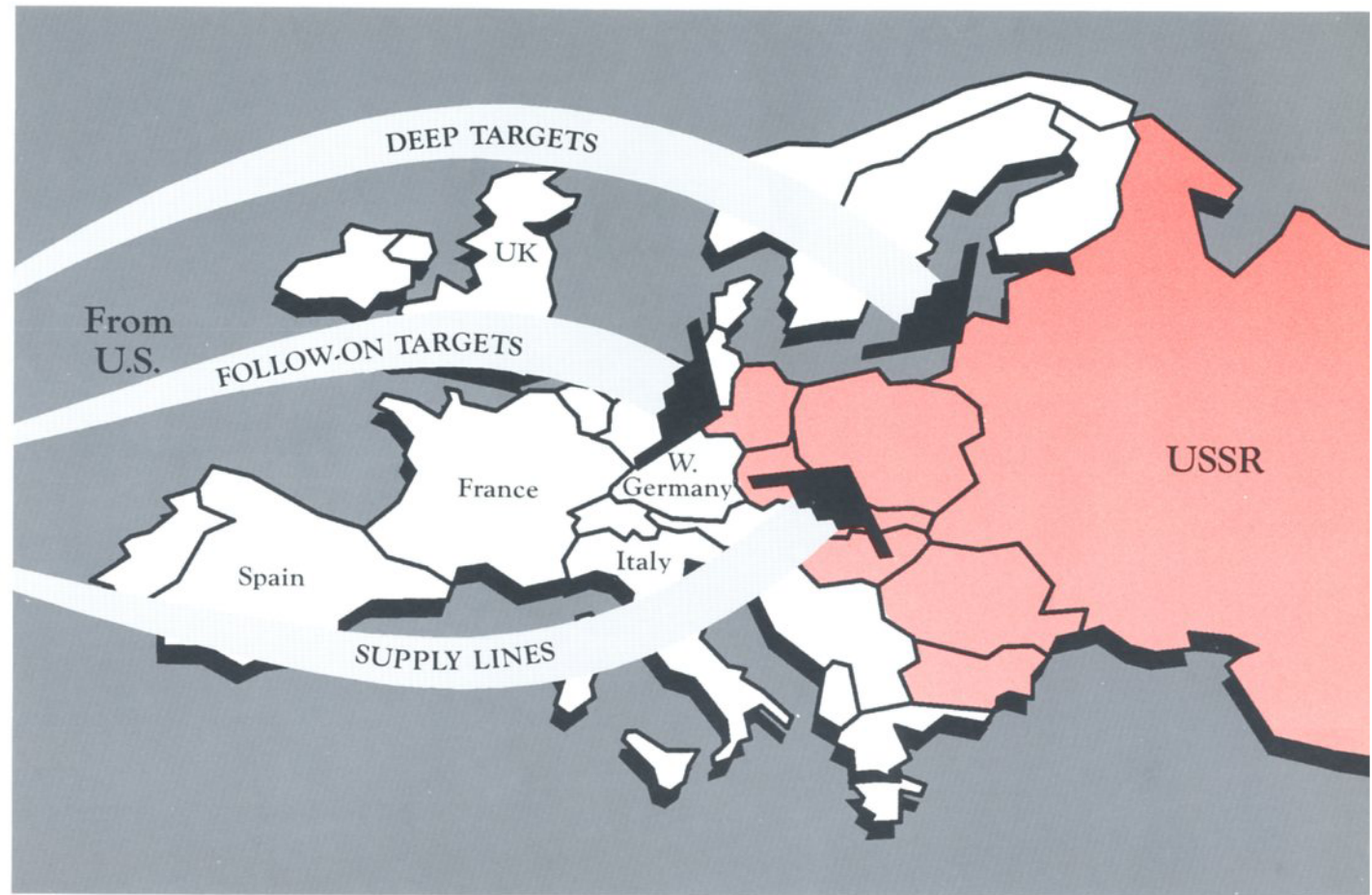


“It obviously would give us significant conventional capability . . . the ability to reach from a handful of bases virtually anyplace on the globe and to do it in a stealthy fashion.”

Richard B. Cheney
Secretary of Defense

THE B-2 WILL OFFER A UNIQUE CONTRIBUTION TO NATO DEFENSE

The large versatile payloads, long range and survivability of the B-2 provide a robust capability to support the defense of NATO from the United States.



“The B-2’s ability to penetrate advanced air defense systems means that it can be used on repeat missions with great effectiveness . . . This tactical capability of the B-2 has become more important in the wake of the INF treaty, and will become of critical importance if we enter into a conventional arms reduction treaty.”

William Perry, former Under Secretary of Defense for Research and Engineering
Hans Mark, former Secretary of the Air Force
Antonia Handler Chayes, former Under Secretary of the Air Force

THE B-2 WILL PROVIDE TIMELY, LONG-RANGE POWER PROJECTION

What if the B-2 had been available to conduct the April 1986 Libyan strike?



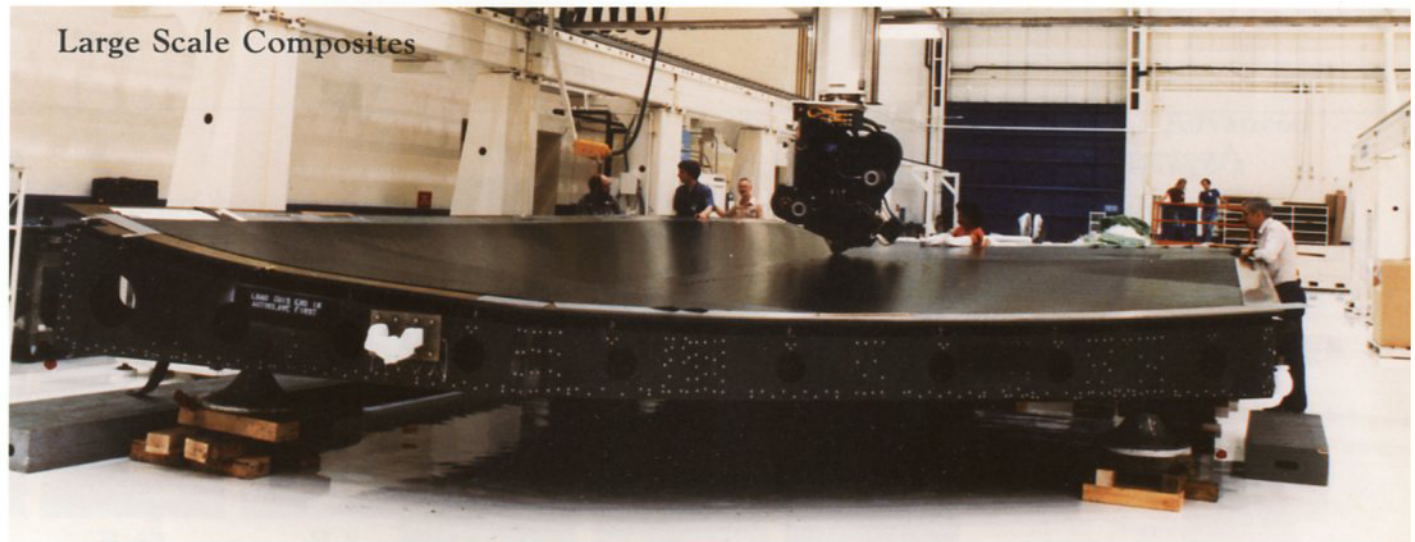
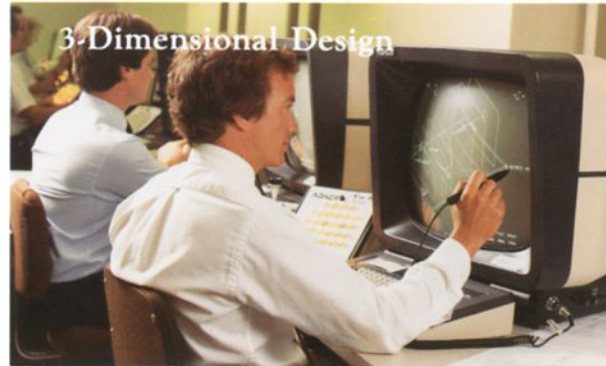
	<i>Strike as Conducted</i>	<i>B-2 Strike</i>
<i>Aircraft at Risk</i>	84	4
<i>Support Aircraft</i>	35	5
<i>Aircrew at Risk</i>	134	8
<i>Time Required</i>	5 Days	Hours

“With precision munitions . . . three-to-four B-2s could have done the same job direct from stateside bases. And because preraid force movements would not be required, the entire operation could have been conducted with vastly less risk of life.”

**General Bernard Randolph, Commander
Air Force Systems Command**

THE B-2 HAS SUCCESSFULLY INTRODUCED A REVOLUTION IN THE TECHNOLOGY OF AIRCRAFT DESIGN AND MANUFACTURING

- First extensive use of 3-dimensional computer-aided design
- Highly automated manufacturing processes
- Largest composite parts ever manufactured

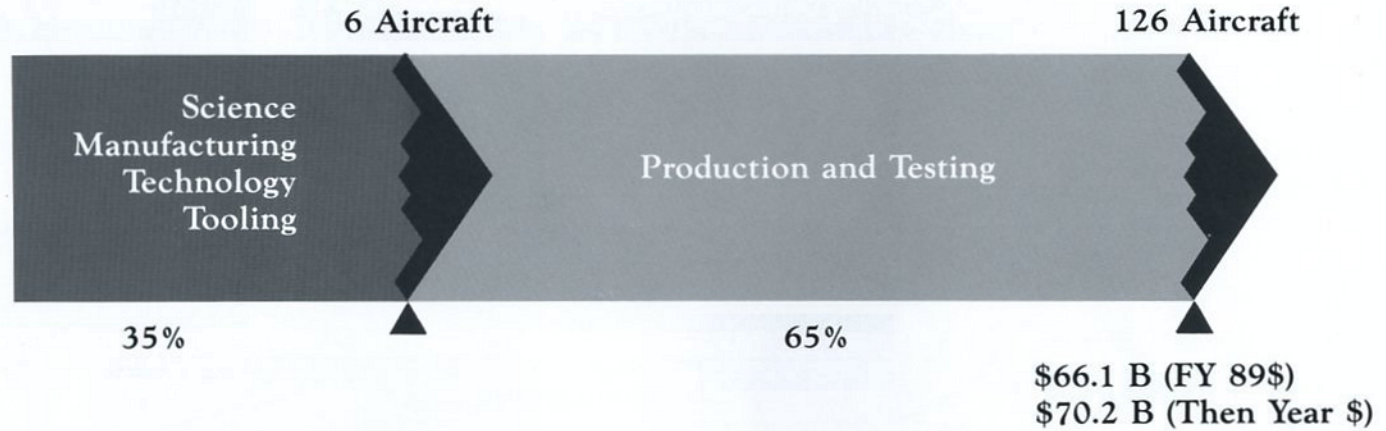


“The manufacturing technologies pioneered by the Northrop team will revolutionize America’s aerospace industries and significantly enhance our industrial base.”

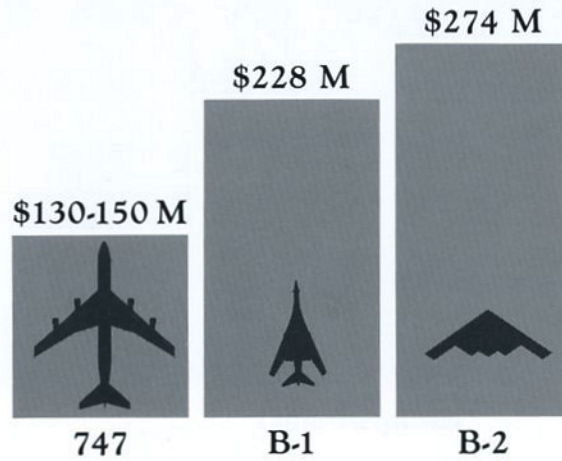
Edward C. Aldridge, Jr.
Secretary of the Air Force

B-2 PROGRAM COST

Development vs Production



Average Flyaway Cost (FY 89\$)



Aircraft costs are customarily given as flyaway cost — which excludes research and development

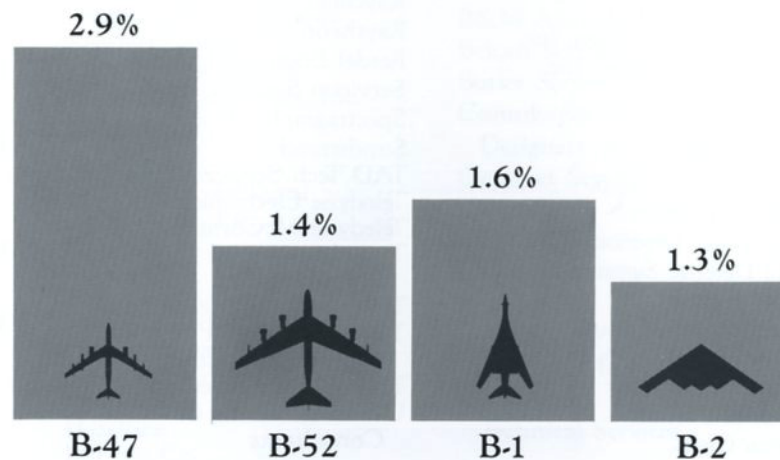
Average flyaway cost of the B-2 is comparable to other large modern aircraft

Growth of program in base year dollars (FY 81\$)



- Growth in program has been 20%
- Most growth has been in R&D to master technology
- Unparalleled manufacturing experience gained in producing 11 B-2s
- High confidence in production cost reflected in fixed price contracts for production aircraft

Percentage of DoD budget during acquisition



The procurement of the B-2 Advanced Technology Bomber will average a smaller percentage of the DoD budget than any of the previous bomber programs.

B-2 program cost includes the “. . . High development cost of introducing a whole new set of technology in the aerospace industry . . . Will contribute to our ability to apply that technology to a whole family of future weapons . . .”

General Larry Welch, Chief of Staff
United States Air Force

B-2 NATIONWIDE INDUSTRIAL TEAM IN 46 STATES

- Northrop is the B-2 prime contractor
- Nationwide, the B-2 Program is supported by tens of thousands of men and women at the major industrial participants, Boeing, LTV, GE, and Hughes, and at suppliers and subcontractors in many of America's most capable high technology firms in 46 states
- Companies whose participation has been declassified by the Department of Defense as of June 14, 1989:

Arizona

Allied Signal Aerospace
Garrett Auxiliary Power, Inc.
Allied Signal,
Fluid Systems Division

California

Allied-Signal Aerospace,
Air Research LA
Applied Consulting &
Tech Service
Associate N/C Programming
B&H Associates
Burns & Roe Pacific
Engineers
Condor Systems, Inc.
Deliotte, Haskins & Sells
Evolving Technology
Ewing Technical Design, Inc.
Explosive Technology, Inc.
Facilities Systems
Engineering
Frequency West
GEC Astronics Corp.
General Dynamics
Electronics Division
Gould Defense Systems
Hughes Aircraft,
Radar System Group
Hughes Electronic Dynamics
Hughes Training &
Control Division
Inconen Corp.

California (continued)

ITT Gilfillan
Jaycor
Kaymar
Lockheed Aircraft Corp.
Mantech Support
Technologies, Inc.
McDonnell Douglas
Aircraft Co.
Mini Systems
Mini-Systems Associates
Multax Systems
Narda Microwave, Inc.
Norman Engineering Co.
Parker Hannifin
PDA Engineering
Raychem Corp.
Raytheon Co.
Resdel Engineering Corp.
Servicon Systems, Inc.
Spectragraphic Corp.
Sundstrand
TAD Tech Services Corp.
Teledyne Electronics
Teledyne McCormick
Texas Instruments
Ridgecrest
TRW, Redondo Beach
TRW, Sacramento
Engineering Office
TRW Space & Defense
UTS Engineering &
Consultants

California (continued)

VERAC Incorporated
Watkins-Johnson Co.
Whittaker Corp.

Colorado

General Devices, Inc.
Kaman Instrumentation
Kaman Sciences Corp
Mantecs
OEA, Inc.
Storage Tech Corp.
Stonehouse Group
Unisys Corp. Defense Systems

Connecticut

Amaco Performance
Products
Ensign Bickford Co.
Hamilton Standard
Tech Systems Corp.

District of Columbia

McKenna, Conner & Cuneo

Florida

Hi Tec
United Technologies *

Georgia

Electromagnetic Devices

Idaho

Vanite Industries

Illinois

Electrodynamics, Inc.
Sundstrand Aviation

Iowa

Rockwell International,
Collins Division

Kansas

Boeing Military Airplane Co.

Kentucky

Keco Industries, Inc.

Maryland

AAI Corp.
Digital Equipment
Fairchild Communications
& Electronics Co.

Massachusetts

Adage, Inc.
Adams-Russell Co., Inc.
Adams-Russell
Electronics Co., Inc.
Fenwal, Inc.
General Electric Aircraft
Equipment Division
Kaman Avidyne
Lighting Technologies
Microdynamics, Inc.
Microwave Associates, Inc.
Microwave Development Labs
Microwave Engineering Corp.
Varian

Michigan

Smith Industries
Aerospace & Defense

Minnesota

Honeywell
Rosemount, Inc.
Unisys Corp.,
Defense Systems

New Hampshire

Continental Microwave &
Tool Co.
Kom Wave Corp.
Sanders Associates, Inc.
Tech Resources, Inc.

New Jersey

Allied Corp.,
Bendix Flight Systems
Kearfott Guidance/
Navigation Corp.
Lockheed Electronics, Inc.
Micro Lab

New Mexico

Los Alamos Technical
Associates, Inc.

New York

Arkwin Industries, Inc.
Eastman Kodak
General Electric
Aircraft Controls
Gull, Inc.
Hazeltine
Miltop Co.

New York (continued)

Moog, Inc.
Scipar, Inc.
Transportable
Technology, Inc.

Ohio

Battelle Columbus
BDM Corp.
General Electric
Aircraft Engineering Group
Logicon

Oklahoma

Defense Technologies, Inc.
TRW Oklahoma
Engineering Office

Texas

B&M Associates
Belcan Services
Butler Service Group
Consultants &
Designers, Inc.
Contract Services
E-Systems
Ernst & Whitney
General Devices
H.L. Yoh
International
Business Machines
Interglobal
Technical Services

Texas (continued)

LTV Aircraft
Products Group
LTV Missiles &
Electronics Group
N/C Services
Nelson, Coulson &
Associates, Inc.
PDS-Tech Services
Pollack & San
Rockwell
International Corp.
Standard Manufacturing Co.
Superior Design Co., Inc.
TAD Technical Services
Versatec
Wang

Utah

Hercules, Inc.

Vermont

Hercules Aerospace
Simmonds Precision

Virginia

Amdahl Federal
Service Corp.
Mantech International Corp.
Xerox

Washington

Boeing Military Advanced
Systems Co.
Eldec Corp.
Ewing Tech Design, Inc.
General Electric
Kirk-Mayer, Inc.
Nelson, Coulson &
Associates, Inc.
RHO Co., Inc.
Science & Engineering
Associates, Inc.
VTC Service Corp.

“As far as I’m concerned, at Northrop they’re putting a tremendous amount of attention on quality . . . on training people to do their jobs . . . on tooling for assembly and . . . the amount of subsystem testing and the quality inspection that they’re doing.”

Donald J. Atwood
Deputy Secretary of Defense

SUMMARY

“It is time that we move this debate from the question of simple cost to one of strategic value. I fully support this program because the country needs it. The B-2 will be a cornerstone in our overall strategic deterrence well into the next century.”

Richard B. Cheney
Secretary of Defense

NORTHROP

