

DECLASSIFIED  
Authority MND 989528  
By JPM NARA Date 7/7/98

*Mr. Gerard Smith*  
(14:30 - 1 April 57)  
(45 minutes) Dry Run -  
(14:00 - 29 Mar. 57)

*Meeting for Secretary's Review*

NATIONAL ARCHIVES

I. Basic Nuclear Types

A. Fission

- 1. Gun-Assembly
- 2. Implosion

B. Thermonuclear

(Brief description of principles of operation and components of nuclear systems)

*file*  
21 April 1957

II. Non-Nuclear Characteristics

A. Fuzing

- 1. Varying Requirements
- 2. Types - Baro, Radar, Timer, Contact

B. Power Supply

C. Warhead Mounting Hardware

(Brief description of these components and why needed)

*file - D.I.E. Helapona*

III. Presently Stockpiled Weapons

A. Implosion

B. Gun-Assembly

C. Thermonuclear

(Above described as to nomenclature, size, weight, yield and applications)

IV. Future Weapons

A. Weapons Under Development

B. Weapons Under Study

(Same as in III above for known factors)

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### V. Comparison of Certain Weapon Parameters

Illustrations of relationships between nuclear cost, yield, weight and diameter by discussion of appropriate graphs

27 March 1957

OFFICE OF THE ASSISTANT SECRETARY FOR  
DEFENSE PROGRAMS AND POLICIES

Washington, D.C.

Subject: Comparison of Certain Weapon Parameters

Reference: Report of the Joint Committee on Atomic Energy, "The Atomic Energy Commission's Program for the Development of a Strategic Defense System," 1956.

Summary: This report discusses the relationships between nuclear cost, yield, weight, and diameter.

The report shows that as the yield of a nuclear weapon increases, the weight and diameter also increase, and the cost rises sharply.

The following graphs illustrate these relationships:

1. Yield vs. Weight: Yield increases with weight, but at a decreasing rate.

2. Yield vs. Diameter: Yield increases with diameter, but at a decreasing rate.

3. Yield vs. Cost: Cost increases with yield, but at an increasing rate.

4. Weight vs. Diameter: Weight increases with diameter, but at a decreasing rate.

5. Weight vs. Cost: Cost increases with weight, but at a decreasing rate.

6. Diameter vs. Cost: Cost increases with diameter, but at a decreasing rate.

7. Yield vs. Cost: Cost increases with yield, but at an increasing rate.

8. Yield vs. Weight vs. Diameter: Yield increases with weight and diameter, but at a decreasing rate.

9. Weight vs. Diameter vs. Cost: Weight and diameter increase with cost, but at a decreasing rate.

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27 March 1957

WEAPONS EFFECTS BRIEFING FOR  
UNDERSECRETARY OF STATE

## OUTLINE

## I. INTRODUCTION -- 5 minutes

A. Connect to previous briefing on Weapons Development.

B. Give scope of briefing

1. What happens when a nuclear weapon explodes - nuclear radiation, thermal radiation, blast, fall-out.

2. The different types of bursts - air, surface, subsurface, and underwater.

3. Vulnerability of persons and inanimate targets to the effects of the weapon.

4. Dependence of the effectiveness of blast, nuclear radiation, thermal radiation, and fall-out on the yield.

5. A brief word about protective measures.

6. Areas to be investigated in future tests.

## II. EXPLOSION OF A NUCLEAR WEAPON -- 10 minutes.

A. Description of explosion.

B. Partition of energy.

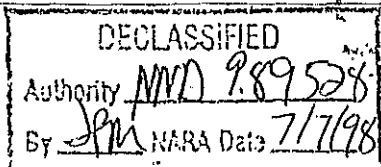
C. Definition of physical effects.

1. Fireball - thermal radiation.

2. Nuclear radiation.

3. Blast wave.

4. The cloud (fallout.)



OUTLINE (Contd.)

D. Types of burst and their relation to these effects

1. Air burst.
  - a. No fall-out.
  - b. Optimize blast effects by formation of Mach wave.
  - c. More direct thermal and nuclear radiation.
2. Surface burst.
  - a. Cratering effect.
  - b. Maximizes fall-out.
  - c. Obtains higher ground pressures.
  - d. Decreases initial nuclear and thermal.

III. VULNERABILITY OF INANIMATE TARGETS -- 10 minutes

A. Blast

1. Primary destruction agent.
2. Explanation of effect of blast wave on target.
3. Examples - (20 KT vs 20 MT).
  - a. Overpressure sensitive target, brick apartment building.
  - b. Drag sensitive target - bridge.

B. Thermal radiation

1. Damage caused by fires.
2. Examples of ignition energies for typical fuels, wood, paper.

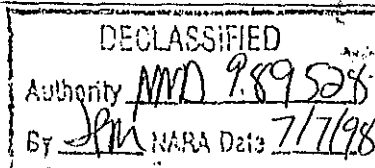
C. Nuclear radiation - Little effect on most inanimate targets.

1. Special case - warhead vulnerability

D. Fall-out - Little effect on inanimate objects except to deny their use

because of contamination problem.

E: Crater - Very hard targets - Compare 20 KT & 20 MT



## OUTLINE (Contd.)

## IV. Vulnerability of Humans - 10 minutes

## A. Initial nuclear radiation

1. Immediate casualty effects "Combat Ineffective."
2. Long range effects.
3. Comparison of radii of effect for 450 Rem 20 KT and 20 MT weapons.

## B. Fall-out

1. Local fall-out.
  - a. Description of mechanism
  - b. Biological hazard, short range and long range.
  - c. Comparison of fall-out patterns for 1 KT and 1 MT weapon.
2. World-wide fall-out.
  - a. Explanation.
  - b. Biological effect.

## C. Thermal radiation.

1. Biological effect - "Combat Ineffective."
2. Comparison of radii of effect of 20 KT and 20 MT air burst.

## D. Blast

1. Least significant casualty producer for shielded personnel.
2. Dynamic pressure effect.
3. Missile effect.

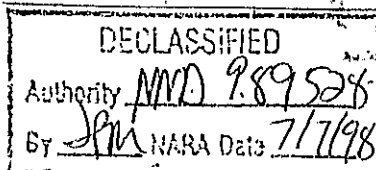
## V. PROTECTIVE MEASURES - 5 minutes

## A. Nuclear radiation - prompt and residual.

1. Shielding factors.
2. Decay rate.

## B. Thermal - cover.

## C. Blast - shielding from dynamic effects.



## OUTLINE (Contd.)

## VI. SUMMARY -- 5 minutes

## A. Review effects.

1. Blast - primarily inanimate targets.
2. Thermal - both inanimate and humans.
3. Nuclear - prompt and residual.
  - a. Primarily personnel hazard.
  - b. Can deny use of inanimate objects.

## B. Chart of radii of effects on Washington and vicinity.

## C. Areas to be investigated in future tests.

1. High altitude effects.
2. Very high pressure.
3. Attenuation of thermal radiation.
4. Fall-out.

*Summary - Gen. Lopez - (15 minutes)*

*Storage Rights  
Deployment & Disposal  
Transfer Procedures  
Authorization for Use*