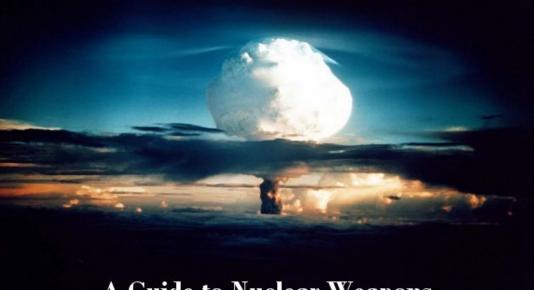
Effects of Nuclear Weapons





A Guide to Nuclear Weapons

Lesson topic 5.2

Enabling Objectives

Describe the physiological effects of ionizing radiation

Describe the blast and thermal effects on personnel and equipment from a nuclear explosion

Blast Effects

#Equipment/structures △Warping, buckling of flight decks ▲ Distortion of airplane elevators △ Distortion of hull framing Cracking of seams **Rupturing of boilers Collapsing** structures **Rupturing of piping systems**

Blast effects

Personnel
Ear injury due to over pressure
Lung injury due to pressure difference (collapse/over inflate)

Water shock wave effects

Equipment/structures
Foundation damage to machinery
Rupture of feed-water & steam lines
Damage to gun mounts
Damage to electronic systems components and disruption of system performance

Water shock wave effects

#Personnel

- Body is displaced, thrown against bulkheads/equipment
- Missile hazards

Thermal effects

% Equipment/structures

- Spontaneous ignition of flammable and porous materials due to intense heat
- ☑ Fires can spread throughout

#Personnel

- ☑ Eye damage from light released at detonation
- Burns to exposed skin
- 100 KT air burst can cause second degree burns up to 4 miles from ground zero

Physiological Effects of Ionizing Radiation

HTypes of radiation doses Acute - less than 24 hours Chronic - longer than 24 hours Whole body - Neck to waist including eyes △LD 50-30 - lethal dose. 50% personnel will die within 30 days Skin dose - dose to skin from beta and weak

gamma radiation that causes burn like injuries

Radiation exposure terms

#TERMS

- Combat Effective (CE) personnel can perform task with little problem
- Combat Ineffective (CI) Personnel can not perform assigned tasks due to sickness or incapacitation. Less than 25% performance
- △Demanding task (DT)
- ▲Undemanding task (UT)
- Performance degraded (PD) 25 to 75%

#0 TO 70 RADS

- Symptoms 6 to 12 hours after exposure (CE)
- None to slight transient headache and nausea
- ✓Vomiting in up to 5% of personnel in upper dose range
- No medical care; return to duty; no deaths anticipated

∧ 70 to 150 RADS

Symptoms - 2 to 20 hours (CE)

- △Transient mild nausea and vomiting in 5 to 30% of personnel
- No medical care, return to duty; no deaths anticipated

△150 to 300 RADS

- Symptoms 2 hours to 2 days
- Transient mild nausea and vomiting in 20 to 70% of personnel
- Mild to moderate fatigability and weakness in 25 to 60%

△Low end range less than 5% deaths

△High end range deaths may occur for more than 50%; survivors return to duty

△ 300 to 530 RADS Symptoms - 2 hours to 3 days Transient moderate nausea and vomiting in 50 to 90% of personnel Moderate fatigability in 50 to 90% Low end range less than 10% deaths High end range deaths may occur for more than 50%; survivors return to duty

- △530 to 800 RADS
- Symptoms 2 hours to 3 days
- △Moderate to severe nausea and vomiting in 80 to 100% of personnel
- ▲ From 2 to 6 weeks moderate to severe fatigability and weakness in 90 to 100%
- Low end range more than 50% deaths at six weeks
- △High end range deaths may occur for 99% at 3 1/2 weeks

830 to 3000 RADS
 Symptoms - 30 MIN to 2 days
 Severe nausea, vomiting, fatigability, weakness, dizziness, and disorientation
 1000 RADS 100% deaths in 2 to 3 weeks
 3000 RADS 100% deaths in 5 to 10 days

3000 to 8000 RADS
 Symptoms - 30 MIN to 5 days
 Severe nausea, vomiting, fatigability, weakness, dizziness, disorientation, and fluid imbalance

△4500 RADS 100% deaths in 2 to 3 days

Greater than 8000 RADS
 Symptoms - 30 MIN to 1 day
 Severe and prolong nausea, vomiting, fatigability, weakness, dizziness, disorientation, and fluid imbalance
 8000 RADS 100% deaths in 1 day

Cumulative nature of radiation exposure

Damage depends on length of exposure and total dose received

- **Body cannot repair all damage**
- #Each subsequent exposure adds to permanent
 damage
- % Latent effects
 - Cataracts, cancers (Leukemia) and shortened life span

Radiation exposure guides

#Wartime

- Setting Maximum Permissible Exposure (MPE)
- △Considers past and future exposures
- Set by Commanding Officer on DCA's recommendation
- Usually set at 150-R but depends on tactical demands

Summary and Review

#Blast effects
#Water shock wave effects
#Thermal effects
#Physiological effects of ionizing radiation