Living in the Shadow of Annihilation: Nuclear Weapons and the Cold War

First Soviet A-Bomb detonated - 1949
First Soviet H-Bomb Detonated - 1953
The Doctrine of Massive Retaliation

Leads to the reality of Mutually Assured Destruction (MAD)
An American B52 Bomber capable of hitting targets within the USSR - First deployed in 1955
Sputnik - 1957

- Intercontinental Ballistic Missiles (ICBMs) could travel between the US and USSR in 25 minutes.
- This led to fears that a successful first strike might erode US deterrence.
- For the next 30 years, both sides focused on making sure their nuclear arsenals could successfully respond to a first strike.
The Nuclear Arms race between the US and the USSR reached its height in the 1980s when both countries had over 70,000 war heads combined.
<table>
<thead>
<tr>
<th>Country</th>
<th>Total Nuclear Weapons</th>
</tr>
</thead>
<tbody>
<tr>
<td>Russia</td>
<td>10,000</td>
</tr>
<tr>
<td>United States</td>
<td>8,500</td>
</tr>
<tr>
<td>France</td>
<td>300</td>
</tr>
<tr>
<td>China</td>
<td>240</td>
</tr>
<tr>
<td>United Kingdom</td>
<td>225</td>
</tr>
<tr>
<td>Pakistan</td>
<td>90 - 110</td>
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<tr>
<td>Israel</td>
<td>60 - 80</td>
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<tr>
<td>India</td>
<td>60 - 80</td>
</tr>
<tr>
<td>North Korea</td>
<td>&lt; 10</td>
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</tbody>
</table>

Total Nuclear Weapons ≈ 19,500

Full Report
cruise missiles or gravity bombs) that were located on bomber bases. New START’s counting rule does not count bomber weapons but instead artificially attributes one weapon to each bomber on a base, giving no incentive to limit the number of weapons at bomber bases: A force of 60 bombers loaded at their maximum capacity of 1,136 bombs and cruise missiles would only count as 60 weapons. Lastly, the abandoned START II agreement prohibited multiple warheads on ICBMs, but New START places no limit on how many warheads can be deployed on each missile (see Table 1).

New START limits the number of deployed delivery vehicles to 700. It is not yet publicly known whether the Air Force will choose to retire additional ICBMs or bombers from the nuclear mission to meet this requirement, but because the treaty limits do not have to be met until 2018 (New START supersedes the Moscow Treaty) there is ample time to make adjustments.

SLBMs and heavy bombers would be the main platforms for uploading reserve warheads in a crisis, a decision that would require the United States to withdraw from the treaty.

Nuclear weapons modernization and production

The Obama administration has made it clear that the United States intends to remain a nuclear weapon state for the foreseeable future. Over the next decade, the Defense Department says it

Table 1. Estimated US deployed strategic nuclear weapons 2011, 2018

<table>
<thead>
<tr>
<th>Weapon system</th>
<th>Delivery vehicles</th>
<th>Warheads</th>
<th>Delivery vehicles</th>
<th>Warheads</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Land-based ballistic missiles</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Minuteman III</td>
<td>450</td>
<td>500</td>
<td>400</td>
<td>400</td>
</tr>
<tr>
<td>W78/Mk12A</td>
<td>250</td>
<td></td>
<td>150</td>
<td></td>
</tr>
<tr>
<td>W87/Mk21</td>
<td>250</td>
<td></td>
<td>250</td>
<td></td>
</tr>
<tr>
<td><strong>Sea-based ballistic missiles</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Trident II D5</td>
<td>288</td>
<td>1,152</td>
<td>240</td>
<td>1,090</td>
</tr>
<tr>
<td>W76-0/Mk4, W76-1/Mk4A</td>
<td>768</td>
<td></td>
<td>706</td>
<td></td>
</tr>
<tr>
<td>W88/Mk5</td>
<td>384</td>
<td></td>
<td>384</td>
<td></td>
</tr>
<tr>
<td><strong>Heavy bombers</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>B-2</td>
<td>16</td>
<td>100</td>
<td>16</td>
<td>100</td>
</tr>
<tr>
<td>B-52 H</td>
<td>44</td>
<td>216</td>
<td>44</td>
<td>200</td>
</tr>
<tr>
<td>Total</td>
<td>798</td>
<td>1,968b</td>
<td>700</td>
<td>1,790c</td>
</tr>
</tbody>
</table>

a There are 113 B-2 and B-52 H bombers, of which 18 and 76, respectively, are nuclear-capable, but only 60 are thought to be nuclear tasked. Some of the B-1 bombers are also considered nuclear-capable under New START although the aircraft were removed from the nuclear mission in 1997. The reduction in ICBMs assumes the upload capability and flexibility of the bomber force will be prioritized.

b There are “considerably less” than 500 bomber weapons present at heavy bomber bases today, but since New START does not count actual bomber weapons, there is no requirement or incentive to further reduce or limit bomber weapons at the bases.

c In addition to these deployed strategic warheads, the stockpile includes another 2,850 strategic and tactical warheads. Plans for the stockpile by 2018 are not known but will likely decline further.

c Under New START, the 1,790 weapons would count only as 1,550 due to the attribution of only one weapon per aircraft. Even with a maximum load-out of 1,136 weapons on the 60 aircraft for a total force level of 2,626 weapons, the total warhead count under New START would still only be 1,550.
The Distant Early Warning System - 1957
The Nuclear Triad

Strategic Bombers

Submarine Launched Nuclear Missiles

ICBMs

Tuesday, May 1, 12
I Trident Submarine is capable of carrying 24 missiles (range 7,500 miles) each of which is capable of carrying 12 independently targetable nuclear warheads that are larger than the weapon that struck Hiroshima.

Thus if only one Trident submarine survived a first strike, it would still destroy 288 city sized targets.
What would happen in a nuclear war?

• What would be targeted?
• What are the effects of a nuclear explosion?
• What would be the effects of a large scale nuclear exchange?
The sprawling network of U.S. nuclear arsenals developed over the past six decades, with thousands of nuclear weapons strategically placed across the country. The United States withdrew weapons from two former nuclear bases (Araxos in Greece and Memmingen in Germany) and placed all B61-10s in the inactive stockpile. The deployment of 480 (+/-10 percent) B61 bombs in Europe, whether the full number was deployed is unclear. Since 2000, the United States has referred to the ex-Soviet Union as "from sea to shining ocean," but it is fitting. Though it is post-Cold War, the United States continues to develop this extensive network of installations over the past six decades. The Pentagon and the National Nuclear Security Administration have worked with the private sector and academic institutions to develop this extensive network of nuclear facilities in 12 states and six European countries (and with nuclear facilities in Asia and the Pacific). The weapons developed this network of nuclear facilities are to the consolidation of weapons at the current facilities; the number of weapons and their locations will change as the United States. The number and their locations will change as the United States continues to ensure the survivability and reliability of its nuclear arsenal. Post-Cold War, plans and their locations will change, and the number and their locations will change as the United States continues to ensure the survivability of its nuclear arsenal.

Locations of U.S. nuclear weapons, 2006

- **Minot AFB, ND**
  - Weapons: B-52H Bombers, Minuteman III ICBMs, ACMs, ALCMs
  - 194 B61-7 bombs
  - 130 B83-1, -0 bombs*
  - 200 W80-1/ALCMs
  - 300 W80-1/ACMs
  - 300 W78s (in 100 ICBM silos)
  - 100 W78s (in 50 ICBM silos)
  - 30 W78s (spares)
  - 1,254 Total

- **Europe**
  - 200 B61-3 bombs
  - 200 B61-4 bombs
  - 400 Total

- **Bangor, WA**
  - Weapons: Trident SLBMs, SLCMs
  - 1,100 W76s/Trident II D5 SLBMs
  - 850 W76s/Trident I C4 SLBMs (inactive)
  - 264 W88s/Trident II D5 SLBMs
  - 150 W80-0s/SLCMs
  - 2,384 Total

- **Warren AFB, WY**
  - Weapons: Minuteman III ICBMs
  - 19 W62s (in 19 ICBM silos)
  - 20 W62s (spares)
  - 39 Total

- **Warren AFB, CO**
  - Weapons: Minuteman III ICBMs
  - 46 W62s (in 46 ICBM silos)
  - 46 Total

- **Warren AFB, NE**
  - Weapons: Minuteman III ICBMs
  - 85 W62s (in 85 ICBM silos)
  - 85 Total

- **Malmstrom AFB, MT**
  - Weapons: Minuteman III ICBMs
  - 150 W62s (in 50 ICBM silos)
  - 10 W62s (spares)
  - 200 W78s (in 100 ICBM silos)
  - 150 W78s (in 50 ICBM silos)
  - 25 W78s (spares)
  - 535 Total

- **Kirtland AFB, NM**
  - In storage
  - 711 W80-1/ALCMs
  - 250 W62s/Minuteman III ICBMs
  - 553 W87s/MX Peacekeeper ICBMs
  - 400 W84/GLCMs (in-reserve)
  - 1,914 Total

- **Nellis AFB, NV**
  - In storage
  - 306 B83-1, -0 bombs*
  - 186 B61-3 bombs
  - 204 B61-4 bombs
  - 206 B61-10 bombs*
  - 902 Total

- **Pantex Plant, TX**
  - Several types of warheads await dismantlement

- **Whiteman AFB, MO**
  - Weapons: B-2 Bombers
  - 35 B61-7 bombs
  - 41 B61-11 bombs
  - 60 B83-1, -0 bombs*
  - 136 Total

- **Barksdale AFB, LA**
  - Weapons: B-52H Bombers
  - 210 B61-7 bombs
  - 130 B83-1, -0 bombs*
  - 500 W80-1/ALCMs
  - 100 W80-1/ACMs
  - 940 TOTAL

- **Kings Bay, GA**
  - Weapons: Trident SLBMs, SLCMs
  - 612 W76s/Trident II D5
  - 468 W76s/Trident I C4 (inactive)
  - 140 W88s/Trident II D5
  - 144 W80-0s/SLCMs
  - 1,364 Total

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* All B61-10 and 83-0 bombs are inactive. ** Presidential Decision Directive 74 of November 29, 2000, authorized deployment of 480 (+/-10 percent) B61 bombs in Europe. Whether the full number was deployed is unclear. Since 2000, the United States withdrew weapons from two former nuclear bases (Araxos in Greece and Memmingen in Germany) and placed all B61-10s in the inactive stockpile.
US Nuclear targets during the Cold War
Effects of a Nuclear Explosion
Effects of an atomic bomb map activity

- This activity simulates the effect of detonating a 1 megaton atomic bomb in room A 211 of Tracy High School.

- Information for this simulation was found at the PBS.org. It is from a companion website to the American Experience episode “Race for the Superbomb” http://www.pbs.org/wgbh/amex/bomb/sfeature/1mtblast.html
Preparation

• Use the note card and the scale on the bottom of your map to make a 4 mile ruler.

• Label the ruler in half mile and mile increments

• On your map, locate and label your house, West High School and Kimball High School
Ground Zero

Label ground zero.

At the center lies a crater 200 feet deep and 1000 feet in diameter. The rim of this crater is 1,000 feet wide and is composed of highly radioactive soil and debris.
Measure and draw the .6 mile radius on your map.

Nothing recognizable remains within about 3,200 feet (0.6 miles) from the center, except, perhaps, the remains of some buildings' foundations. 100% likely killed.
Measure and draw the 1.7 mile radius on your map.

At 1.7 miles, only some of the strongest buildings -- those made of reinforced, poured concrete -- are still standing. Ninety-eight percent of the population in this area are dead.
2.7 miles

Measure and draw the 2.7 mile radius on your map.

Virtually everything is destroyed between the 1.7 and 2.7 miles from ground zero. The walls of typical multi-story buildings, including apartment buildings, have been completely blown out. The bare, structural skeletons of more and more buildings rise above the debris as you approach the 2.7 miles from ground zero. Single-family residences within this area have been completely blown away -- only their foundations remain. Fifty percent of the population between the 1.7 and 2.7 miles from ground zero are dead. Forty percent are injured.
Measure and draw the 4.7 mile radius on your map.

Any single-family residences that have not been completely destroyed are heavily damaged. The windows of office buildings have been blown away, as have some of their walls. The contents of these buildings' upper floors, including the people who were working there, are scattered on the street. A substantial amount of debris clutters the entire area. Five percent of the population between the 2.7 and 4.7 miles of ground zero are dead. Forty-five percent are injured.
Nuclear Fallout

One of the effects of nuclear weapons detonated on or near the earth's surface is the resulting radioactive fallout. Immediately after the detonation, a great deal of earth and debris, made radioactive by the blast, is carried high into the atmosphere, forming a mushroom cloud. The material drifts downwind and gradually falls back to earth, contaminating thousands of square miles.
0-30 miles down wind

Unsheltered exposure results in much more than a lethal dose of radiation. Death can occur within hours of exposure. About 10 years will need to pass before levels of radioactivity in this area drop low enough to be considered safe, by U.S. peacetime standards.
30-90 miles down wind

Unsheltered exposure results in a lethal dose of radiation. Death occurs from two to fourteen days.
90-160 miles down wind

Unsheltered exposure results in extensive internal damage, including harm to nerve cells and the cells that line the digestive tract, and results in a loss of white blood cells. Temporary hair loss is another result.
Effects of a Large scale nuclear attack on the United States during the Height of the Cold War

In 1979 the US office of technology assessment conducted a study of the likely result of a full scale nuclear war with the Soviet Union.
Findings

• Between 100 and 165 millions Americans would die within the first 30 days of the attack. The population of the US in 1979 was 225 million. Deaths due to radiation, injury, civil disorder and inadequate medical care would likely add tens of millions more to this total.

• The 30 largest cities and many smaller cites would be almost completely destroyed.

• Emergency services, government will largely be destroyed, leaving survivors to fend for themselves.

  “Rescuing and treating the injured will have to be done against near insurmountable odds. Fire and rescue vehicles and equipment not destroyed will find it impossible to move about in any direction. Fires will be raging, water mains will be flooding, power lines will be down, bridges will be gone, freeway overpasses will be collapsed, and debris will be everywhere. People will be buried under heavy debris and structures, and without proper equipment capable of lifting such loads, the injured can- not be reached and will not survive. The fortunate ones that rescuers can reach will then be faced with the unavailability of treatment facilities. Hospitals and clinics in downtown areas would likely have been destroyed along with most of their stocks of medical supplies. Doctors, nurses, and technicians needed to man makeshift treatment centers are likely to have been among the casualties.”

• Radiation exposure would lead to cancer deaths numbering into the millions in subsequent years. Virtually none of the modern treatments that were available prior to the war would be available.

• Similar effects would be seen in any targeted area. This would likely include Europe, much of Asia (especially Japan, China and India) and some regions outside the Northern hemisphere.
Nuclear Winter

Scientists in the 1980s began to study the impact of a nuclear war on Global climate.

They concluded that smoke and dust from nuclear explosions would block much of the sun’s energy from reaching the earth. This resulting “nuclear winter” would lower world wide temperatures (to below freezing in most parts of the US), reduce growing seasons and have a calamitous effect of world agriculture. Reduced temperatures could continue for decades.
Reflection

• Would you have survived if you were at home?

• Imagine that you did survive. What challenges would you and the other survivors face? Describe at least three in detail.

• How would the threat of nuclear war have changed your experience of life?