The Bomb: History and Memory

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Sophomore Tutorial: April 12, 2010
Nuclear fission in 1939: bench-top science, largely theoretical
Manhattan Project: 130,000 employees, over 30 sites
Cost: $1.9 billion in 1945 dollars, $117 billion in 2007 dollars
1939-1941: Investigations

Early 1939: Hahn, Meitner, et al: nuclear fission
Aug. 1939: Einstein letter to Roosevelt
Sept. 1939: Germany invades Poland
Oct. 1939: Roosevelt approves gov’t money for uranium research

Summer 1940: Uranium work taken over by National Defense Research Committee

Spring 1941: Office of Scientific Research and Development created, takes over work

Dec. 1941: Crash program begins; Pearl Harbor attack
<table>
<thead>
<tr>
<th>Date</th>
<th>Event</th>
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<tr>
<td>Summer 1942</td>
<td>Oppenheimer conference, UC Berkeley</td>
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<td>Fall 1942</td>
<td>Creation of Manhattan Engineer District, US Army Corps of Engineers; General Groves takes over</td>
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<td>Oct. 1942</td>
<td>Oppenheimer made scientific director</td>
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<td>Nov. 1942</td>
<td>Los Alamos site selected</td>
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<td>Dec. 1942</td>
<td>First nuclear reactor goes critical, U. of Chicago</td>
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<td>Feb. 1943</td>
<td>Oak Ridge construction begins</td>
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<td>Apr. 1943</td>
<td>Lab established at Los Alamos</td>
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<tr>
<td>Oct. 1943</td>
<td>Hanford construction begins</td>
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Site W—Hanford, Washington
plutonium production, first industrial nuclear reactors
Site X—Oak Ridge, Tennessee
uranium enrichment, largest factory in the world
Site Y—Los Alamos, New Mexico
bomb research, design, and assembly
“Trinity,” July 16, 1945
explosive equivalent to 18,000 tons of TNT
Hiroshima: 120,000 deaths
Nagasaki: 80,000 deaths
60% due to fire
30% due to structural collapse
Distance from Harvard to downtown Boston: 5.2 miles

Boston population: 600,000 people
Metro Boston: 3.3 million people
Near-total fatalities for 0.6 mi$^2$ (radius=0.45 mi)
Third-degree burns for 6.2 mi$^2$ (radius=1.4 mi)

“Fat Man” bomb — same as Nagasaki, Trinity — 18 kilotons
Near-total fatalities for 42.5 mi² (radius=3.68 mi)
Third-degree burns for 1,125.7 mi² (radius=18.93 mi)

“Ivy Mike” bomb — first U.S. H-bomb (1952) — 10.4 megatons
Should we have used the bomb on Japan?

**Traditional “Yes”**

Brought a speedy end to the war without invasion

Saved both U.S. and Japanese lives on the whole

All parties engaged in “total war”

**Traditional “No”**

War would have ended soon anyway

Should have demonstrated before use on city

Unacceptable civilian casualties, immoral
Big Historiographical Questions

• Why two bombs? (Was Nagasaki necessary?)

• Were bombs fundamentally “special”? (Different than firebombing? Who thought it was “special”; who didn’t?)

• How was debate about bombing shaped? (Use of secrecy, official releases)

• Was a “decision” to use the bomb really made? (Bureaucratic momentum? “Special” consideration?)

• How can we evaluate counter-factual narratives? (We can’t replay the past with new variables)

• Transformation of science after the bomb
“No dinner party is a success without at least one physicist.”
Harper’s Magazine, 1946
“The ‘absent-minded’ professors with their theories of relativity and interminable formulae shed their black alpaca coats and overnight donned the tunic of Superman.”
— Life magazine, August 1945
Even Bigger Questions

- What is the moral responsibility of a scientist for the uses of their work?
- Has reliance on state funding unduly affected the direction of science?
- How do we perform our duties as citizens in an age where esoteric scientific knowledge can have world-wide political and social implications?
James B. Conant, President of Harvard, 1933-1953

"...the potential power of destruction of the atomic bomb is the price we pay for health and comfort in this scientific age..." (1946)

“You have to get the past straight before you do much to prepare people for the future.” (1947)