**Handout 1**

**Why the bomb was dropped on**

**Hiroshima**

In the US, with the atomic bomb development still underway, it

was decided in September 1944 to use the bomb against Japan. The

United States wanted to force Japan's surrender as quickly as

possible to minimize American casualties. In addition, the United

States needed to use the atomic bomb against Japan before the

Soviet Union entered the war to establish US dominance after the

war. Further, the Americans wanted to use the world's first atomic

bomb for an actual attack and observe its effect. For these reasons,

those in charge were in a hurry. Shortly after successfully testing

history's first atomic explosion on July 16, 1945, the order to drop

the atomic bomb was issued on July 25.

Based on this order, a field operation order dated August 2 called

for the attack to take place on August 6, with Hiroshima to be the

primary target. It is thought that Hiroshima was selected for the

following reasons:

1. The size and topography of the city made it suitable for testing

the destructive capabilities of the atomic bomb, and for confirming

the destructive effects later.

2. There was a concentration of military troops, installations, and

factories in Hiroshima that had been spared previous bombing.

**Handout 2 (Part 1)**

**The Nagasaki Bomb**

Compared to one used on Hiroshima, the Nagasaki bomb was

rounder and fatter, so it was called "Fat Man." The fissile material

was plutonium 239. The plutonium was divided into subcritical

portions and packed into a spherical case. To cause the chain

reaction, gunpowder around the periphery of the case was used to

force the units to the center. Thus, it was called an "implosiontype"

bomb.

The fission of slightly more than one kilogram of plutonium 239 is

thought to have released destructive energy equivalent to about

21,000 tons of TNT.

Length: Approx. 3.2 meters (128 inches)

Weight: Approx. 4.5 tons (10,000 pounds)

Diameter: Approx. 1.5 meters (60 inches)

Element: Plutonium 239

**Handout 2 (part 2)**

**Welcome to A-Bomb WWW**

**Museum**

"Little Boy" is the nick name given to the atomic bomb dropped on

Hiroshima on ***August 6, 1945***. It was Monday morning. Little Boy

was dropped from the Enola Gay, one of the B-29 bombers that

flew over Hiroshima on that day.

**Little Boy**

After being released, it took about a minute for Little Boy to reach

the point of explosion. Little Boy exploded at approximately 8:15

a.m. (Japan Standard Time) when it reached an altitude of 2,000 ft

above the building that is today called the "A-Bomb Dome."

The July 24, 1995 issue of Newsweek writes:

*"A bright light filled the plane," wrote Lt. Col. Paul Tibbets, the*

*pilot of the Enola Gay, the B-29 that dropped the first atomic*

*bomb. "We turned back to look at Hiroshima. The city was hidden*

*by that awful cloud...boiling up, mushrooming." For a moment, no*

*one spoke. Then everyone was talking. "Look at that! Look at that!*

*Look at that!" exclaimed the co-pilot, Robert Lewis, pounding on*

*Tibbets's shoulder. Lewis said he could taste atomic fission; it*

*tasted like lead. Then he turned away to write in his journal. "My*

*God," he asked himself, "what have we done?"* (special report,

"Hiroshima: August 6, 1945")

*note: Paul Tibbets was Colonel, not "Lt. Colonel," when he was the*

*pilot of the Enola Gay.*

The Little Boy generated an enormous amount of energy in terms

of air pressure and heat. In addition, it generated a significant

amount of radiation (Gamma ray and neutrons) that subsequently

caused devastating human injuries.

The people who saw the Little Boy often say "We saw another sun

in the sky when it exploded." The heat and the light generated by

the Little Boy were far stronger than bombs which they had seen

before. When the heat wave reached ground level it burnt all before

it including people.

The strong wind generated by the bomb destroyed most of the

houses and buildings within a 1.5 miles radius. When the wind

reached the mountains, it was reflected and again hit the people in

the city center. The wind generated by Little Boy caused the most

serious damage to the city and people.

**Handout 3**

**That Day in Hiroshima**

Monday morning, August 6, 1945, was clear, bright, and cloudless.

As the mid-summer sun climbed into the sky, the temperature rose

rapidly. At 7:09 a.m. a yellow alert sounded, and many people

retreated into air-raid shelters, but the attack turned out to be just

one American plane flying at high altitude, the alert was lifted at

7:31 a.m. The people left their shelters and started off to work.

That single plane had been observing the weather for the atomic

bombing.

The city of Hiroshima was the political and economic heart of the

Chugoku Region. It was an educational center as well as a major

military base. On that day, some 350,000 people, including over

40,000 military personnel, are thought to have been in the city.

Though it was August, the war prevented schools from taking

normal vacations. Students in middle school and above were

mobilized for daily work at factories or removing debris at

demolition sites. On August 6, approximately 8,400 students,

mainly first and second year male and female middle-school

students, were scheduled to help with the demolition work.

Children attending national school (now called elementary school)

in the third grade and above had been evacuated to the countryside,

so only young children remained in the city.

**Handout 4**

**Explosion**

Based on research thus far, it is believed that the atomic bomb

exploded approximately 580 meters in the air over the Shima

Hospital in Saiku-machi (now Otemachi 1 chome), about 300

meters southeast of the Aioi Bridge. At the instant of detonation,

the temperature of the air at the point of explosion exceeded a

million degrees Celsius (the maximum temperature of conventional

bombs is approximately 5,000 \_C). A white-hot fireball appeared

millionths of a second after detonation. After 1 second, the fireball

reached a diameter of approximately 280 meters. For the following

three seconds, it emitted powerful heat rays, and continued to shine

visibly for approximately 10 seconds.

At the instant of explosion, intense heat rays and radiation were

released in all directions. The pressure on the surrounding air

created a blast of unimaginable force. The cloud generated by the

explosion rose on powerful updrafts. As the pillar of radiationladen

soot and smoke reached the bottom of the stratosphere, it

spread horizontally to a diameter of several kilometers, forming a

giant mushroom cap. Of the energy released, about 35% was in the

form of heat, 50% was blast, and about 15% was radiation.

**Handout 5**

**Nature of the A-bomb Damage**

1. Massive destruction and loss of life from the enormous

explosion.

2. Destruction was instantaneous.

3. In addition to suffering tremendous social and economic losses,

the health of survivors was subject to continuing damage due to the

aftereffects of burns and radiation. The complex effects of this

permanent anxiety compounded by their other losses created

numerous obstacles that impaired their recovery of physical and

economic well-being.

**Casualties**

Approximately 140,000 dead (±10,000) as of the end of December

1945.

**Handout 6**

**Damage to buildings**

Because the A-bomb exploded close to the center of the city, and

because 85% of the buildings were within 3 km of the hypocenter,

destruction to the city was nearly complete, with 90% of buildings

collapsed or burned. (August 1946 Survey by the Hiroshima City

Government)

**Damage due to Blast**

At the instant of explosion, a super-high air pressure of several

hundred thousand atmospheres was created at the epicenter, which

generated a powerful shock wave. The air pressure at the

hypocenter was 35 t/m2 . The wind blew at 440 meters per second

(about 1,000 mph). Thousands of people were killed or injured

when they were hurled through the air or crushed under their

collapsed houses. The blast also shattered windows, filling the air

with glass fragments that penetrated deep into the victims' bodies.

Even quite recently, glass fragments received that August 6 have

been removed from survivors complaining of mysterious pains.

Nearly all wooden buildings within approximately 2 kilometers of

the hypocenter collapsed; even ferro-concrete buildings near the

hypocenter were crushed.

http://www.pcf.city.hiroshima.jp/peacesite/English/Stage1/S1-5E.html

**Handout 7**

**Damage due to High-temperature Fires**

The intense heat rays emitted by the explosion caused the wood and

paper houses and anything burnable in the downtown area to burst

into flame. Fires were also started by toppled kitchen stoves. The

city-wide conflagration reached its peak between 10:00 a.m. and

2:00-3:00 p.m., but fires continued to burn intensely all day.

Most combustible material within approximately 2 km of the

hypocenter was burned to cinders and ash. The extreme heat melted

glass and metal like lava. When the flames died away, the city was

nothing but a scorched plain stretching out in all directions.

**Handout 8**

**Damage due to Radiation**

The explosion instantly released a tremendous amount of initial

radiation within 2 km of the hypocenter. Given that half of those

who receive 4 grays of radiation die, it is assumed that at least half

of the people who were in the open within 1 km of the hypocenter

died mainly from the initial radiation.

Acute radiation effects extended for 4 months after the bombing,

and these disorders appeared in survivors exposed close to the

hypocenter and the characteristic radiation-sickness symptoms

included destruction of cells and hematopoietic organs, disorders in

internal organs, lowering of immune function, loss of hair.

The tremendous fire that burned downtown caused intense

firestorms and whirlwinds. Within 20 to 30 minutes, a heavy black

rain began falling in areas to the northwest. This rain contained

large amounts of radioactive soot and dust, thus contaminating

areas far from the hypocenter. It is said that fish died in ponds and

rivers, and people who drank well water suffered from diarrhea for

about 3 months.

After the explosion, high levels of residual radiation remained on

the ground for an extended period. Many who did not directly

experience the bomb were affected.

http://www.pcf.city.hiroshima.jp/peacesite/English/Stage1/S1-

5E.html

**Handout 9**

**The Painful Aftereffects**

Radiation caused myriad disorders for decades. Even today, after

more than fifty years, the full range of effects of radiation taken

into the body has yet to be clarified. Many survivors continue to

suffer from those effects.

Keloids Beginning in early 1946, scar tissue covering apparently

healed burns began to swell and grow abnormally into mounds of

thick, twisted flesh called keloids. Keloids occured in 50 to 60% of

people who suffered burns directly from the heat ray within a

radius of 2 kilometers from the hypocenter.These keloids were a

source of great physical and emotional pain for the survivors.

Keloids on the arm and back; October 1945 / US Army photo

Leukemia

**Japan Lesson Question Sheet**

**WWII and the Dropping of the Atomic Bombs**

**Handout 1 questions:**

1. What was the date that it was decided that the US would drop Atomic bombs on Japan?

Why did the US want to drop the bombs on Japan? Give at least 3 reasons.

2. What was the date of the first atomic explosion and when was the order given to drop the

bomb?

3. What are the 2 reasons that Hiroshima was chosen as a target?

**Handout 2 (part 1) questions:**

1. What was the nickname of the bomb that was dropped on Nagasaki?

2. The bomb that was dropped was equal to how much TNT?

3. What type of bomb was dropped on Nagasaki?

**Handout 2 (part 2) questions:**

1. What was the nickname of the bomb dropped on Hiroshima? What was the name of the plane

that dropped it?

2. Who was the piolet of the plane and how did he feel about what they had done?

3. What caused the most damage from the bomb that was dropped? How big was he radius of

the distruction?

**Handout 3 questions:**

1. What type of day was it that morning in Hiroshima?

2. What are 3 reasons why Hiroshima was so important?

3. How many students were in Hiroshima and what were they supposed to do that day? Why

were the students not on vacation?

**Handout 4 questions:**

1. How hot was the air at the point of explotion?

2. After one second after the dropping of the bomb how big was the fireball and how long did it

last?

3. What types of energy was released and how much of each was it?

**Handout 5 questions:**

1. How quick was the destruction of the bombs?

2. What two after effects did the victims of the bombs have to deal with?

3. As of the end of December 1945 how many dead were there?

**Handout 6 questions:**

1. How much and what type of damage was done to Hiroshima?

2. How fast did the wind blow at the hypocenter of the blast?

3. What danger did glass cause during the explotion?

**Handout 7 question:**

1. What happened to wood and paper houses?

2. How far away did heat cause combustible material to catch fire?

3. What damage did the extreme heat cause to other materials? What did the city look like after

the blast?

**Handout 8 questions:**

1. What happened to people with in 1 km who were out in the open during the blast?

2. What effects did the radiation have 4 months after the blast? Give 3 examples.

3. How did the radiation spread to people further away from the blast? What happened to rivers

and wells?

**Handout 9 questions:**

1. Are the full effects of the blast on peoples health known yet today? About how many years

has it been?

2. What has happened to victims who suffered burns from the blast?

3. What other long term problems has the bomb caused? Give at least 3 examples.