- What ended Japan's Imperialistic ambitions at the end of World War II in August, 1945?

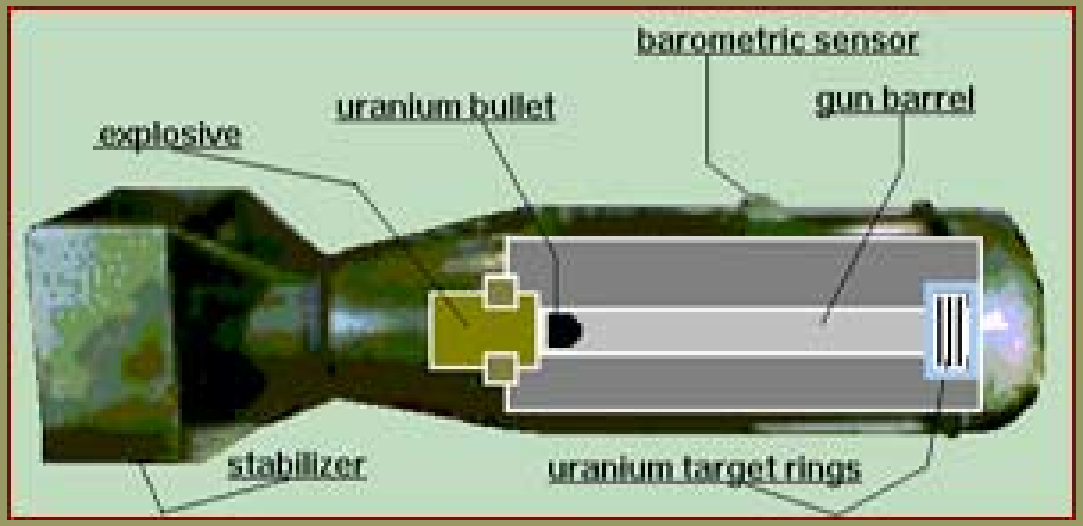
- The U.S. drops atom bombs on the Japanese cities of Hiroshima and Nagasaki to force Japan to surrender!

NEW NUCLEAR NIGHTMARES

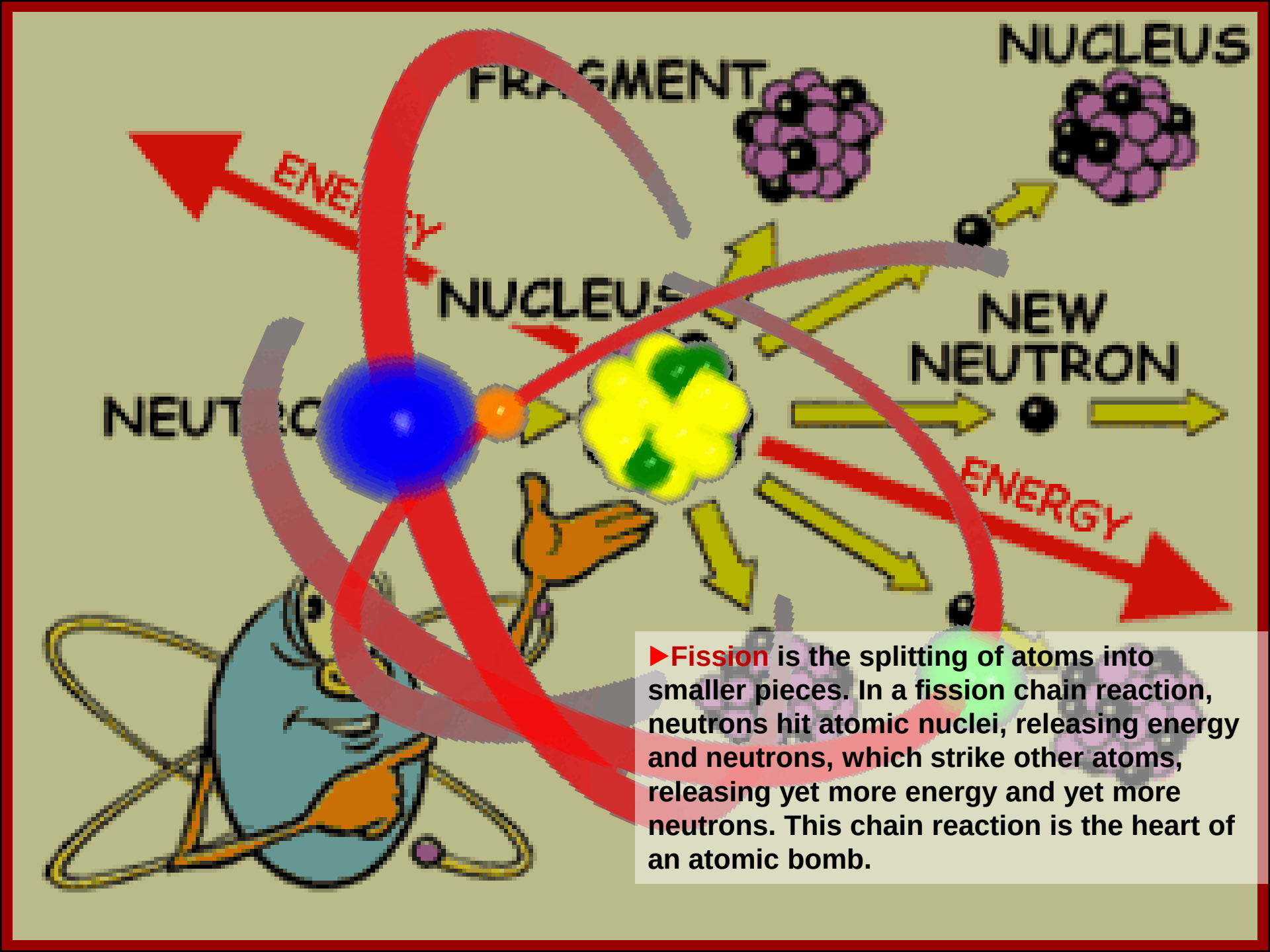
Ingredients list for a nuclear bomb

At its simplest, an atomic (fission) bomb does one thing: It assembles a "critical mass" of fission fuel fast enough to start a chain reaction: One liberated neutron strikes a uranium nucleus, releasing energy and more neutrons. If the process occurs in the eyeblink of time before the bomb blows itself apart, you have the kind of fission weapon that destroyed Hiroshima and Nagasaki.

(Hydrogen bombs, AKA fusion bombs, are more powerful, but much more difficult to make. Thus the proliferation debate focuses on fission bombs.)



An atomic bomb requires two key ingredients: Expertise and bomb fuel.



▶**Fission** is the splitting of atoms into smaller pieces. In a fission chain reaction, neutrons hit atomic nuclei, releasing energy and neutrons, which strike other atoms, releasing yet more energy and yet more neutrons. This chain reaction is the heart of an atomic bomb.

VOCABULARY

Energy: any source of usable power
Proton: a particle which is found in the nucleus of an atom and which has a positive electric charge.
Neutron:a particle which is found in an atom's nucleus and which has no electric charge.
Electron: a particle which orbits an atom's nucleus and which has a negative charge.
Nucleus:the center of the atom where protons and electrons are located.
Radioactive elements: unstable atoms (see below)
Fission: the process by which a large atomic nucleus splits to form two smaller ones.
Fusion: a process in which nuclei of atoms join together, releasing tremendous energy.

NOTES

Six forms of energy: mechanical, heat, electrical, wave, chemical, and nuclear.
Sources of energy: for example, heat (coal, natural gas, solar, atomic, geothermal, and thermonuclear), mechanical motion (falling water, wind)

▶WARM UP ACTIVITY

▶Some strategies that were considered by scientists and the Truman Administration.

▶Question: What would be the pros and cons of each?

	A. For this idea:	B. Against this idea:
1. Keep our invention of the bomb a complete secret and do not use it in this war.		
2. Detonate the bomb in an American desert so that the Japanese can hear about its power.		
3. As above, but specifically invite members of Japan over and then give them a new opportunity to surrender before full use of the weapon is employed.		
4. Give a military demonstration in a deserted part of Japan followed by a renewed opportunity to surrender before we drop the bomb on a Japanese city.		
5. Use the bomb immediately and mercilessly on a Japanese City.		

Judgements

We had the means to end the war quickly, with a great savings of human life. I believed it was the sensible thing to do, and I still do.

-Luis W. Alvarez, physicist

We were afraid that Hitler had the bomb first, and we made this bomb, which shortened the war and saved a lot of American and Japanese lives in the Japanese war.

-Victor Weisskopf, physicist

If I had known that the Germans would not succeed in constructing the atom bomb, I would have never lifted a finger.

-Albert Einstein, physicist

I think it was necessary to drop one, but the second one could have easily been avoided. I think Japan would have capitulated anyway.

-Hans Bethe, physicist

I believe it was an error that Truman did not ask Stalin to carry on further talks with Japan, and also that the warning to Japan was completely inadequate

- J. Robert Oppenheimer, physicist

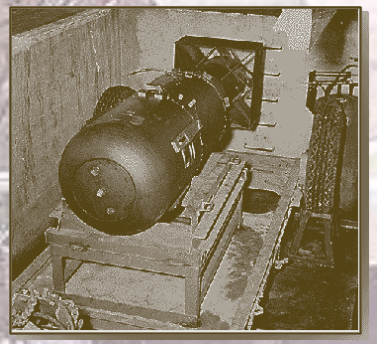
Discussion Points:

"Scientists should continually push the boundaries of what is possible and not consider the potential effects of their research"

"There are no circumstances in which a government has the right to keep secrets from its citizenry"

The Decision to Drop the A-Bombs: Was it the right thing to do?

Col. Tibbets waves from the cockpit of his B-29 prior to takeoff



- **August 6, 1945 – Enola Gay drops bomb on Hiroshima**
  - 140,000 dead; tens of thousands injured; radiation sickness; 80% of buildings destroyed
- **August 9, 1945 – second bomb dropped on Nagasaki**
  - 70,000 dead; 60,000 injured

Key Facts and Consequences of the A-Bomb

- On August 6th 1945, the Enola Gay, a USA bomber, dropped a bomb called "Little Boy" on Hiroshima.
- Hiroshima was the first city ever targeted to be bombed by an atomic weapon. The battles at Dunkirk, the Battle of Britain and even Stalingrad seemed to pale into comparison with what took place in Hiroshima.
- The initial heat blast was 900 times hotter than the surface of the sun.
- 80,000 people were killed instantly – many vaporized underneath the bomb blast.
- By 1950, 200,000 people had died as a result of the bomb.
- Between 1950-1980, a further 97,000 people died from cancers associated with the radiation caused by "Little Boy"

The Atomic Bomb

★ Interpreting Primary Sources

Nuclear bombs cannot possible remain a "secret weapon" at the exclusive disposal of this country for more than a few years. The scientific facts on which their construction is based are well known to scientists of other countries. Unless an effective internal control of nuclear explosives is instituted, a race for nuclear armaments is certain to ensue following the first revelation of our possession of nuclear weapons to the world....In the war to which an armaments race is likely to lead, the United States, with its agglomeration of population and industry in comparative few
metropolitan districts, will be at a disadvantage compared to nations whose population and industry are scattered over large areas.

We believe that these considerations make the use of nuclear bombs for an early unannounced attack against Japan inadvisable. If the United States were to be the first to release this new means of indiscriminate destruction upon mankind, we would sacrifice public support throughout the world, precipitate the race for armaments, and prejudice the possibility of reaching international agreement on the future control of such weapons.

Scientists' petition against use of the atomic bomb, June, 1945

I realize the tragic significance of the atomic bomb. Its production and its use were not lightly undertaken....But we knew that our enemies were on the search for it. We know now how close they were to finding it. And we know the disaster which would come to this nation...to all civilizations, if they had found it first....

Having found the bomb we have used it. We have used it against those who attacked us without warning at Pearl Harbor, against those who have starved and beaten and executed American prisoners of war, against those who have abandoned the pretense of obeying international laws of warfare. We have used it in order to shorten the agony of war, in order to save the lives of thousands and thousands of young Americans.

President Truman defends his decision to drop the atomic bombs, August, 1945

★ Questions To Think About

1. What political and military factors led President Truman to order the atomic bombing of Japan?

2. What alternatives were available to him?

3. On what grounds do Truman's critics question his decision?

4. In your opinion was the decision to drop atomic bombs on Japan correct?

Mayor of Hiroshima

On July 11, 2001, the mayor of Hiroshima, Tadanori Akiba, met with with Keizai Koho Fellows. These were visiting educators from Australia, Canada, the United Kingdom, and the United States. During the formal meeting, he briefly reviewed the devastation of the atomic bomb on Hiroshima and the rebuilding that has taken place over the past fifty-plus years. He hoped that the educators would share their firsthand knowledge with students and colleagues. In his closing remarks, Mayor Akiba stated, "We will not repeat the evil. The only way we can make the world better is to learn from history. We should not forget."

Photos courtesy of Sam Ayers

- If you were traveling to Hiroshima, Japan, what would you say to Mayor Akiba?
- **What can you do to promote peace and reduce or remove the threat of nuclear war?**