

# *Thoughts Inspired by Dr. Atomic*

*Henry Frisch*

*Enrico Fermi Institute, Univ. of Chicago*

## *OUTLINE:*

- 1. Edward R. Murrow's 'See It Now'- the re-enactment of the first chain reaction (Dec. 2, 1942)*
- 2. Chicago and the Plutonium bomb; Lawrence and the Hiroshima bomb- some basics of nuclear physics*
- 3. Los Alamos (rural Sandoval County)- How did Sellars and Adams get it so right? (at least consonant with family stories)*
- 4. The Sense of Urgency- captured so well by Adams's music.*

*Urgency building the weapons- urgency afterwards for civilian control and international recognition of the danger.*
- 5. The technical basis of the urgency- U235 (quote Alvarez)*
- 6. The Bulletin of the Chicago (later Atomic) Scientists, 1945-present*

# *Suggested Reading*

- *Fermi Remembered; James Cronin, ed. (UC Press, 2004)*
- *J. Robert Oppenheimer; A. Pais (Oxford U. Press, 2007)*
- *Alvarez; Adventures of a Physicist, L. Alvarez (Basic Books, 1987)*
- *Atomic Bombs; John Coster-Mullen (self-pub, 2002- see blackboard that Teller and Oppie stand in front of in Act I)*
- *The Making of the Atomic Bomb; Richard Rhodes (Touchstone, 1986)*
- *Dark Sun The Making of the Hydrogen Bomb; Richard Rhodes (Touchstone, 1995)*
- *The Wizard War; R. V. Jones (Wiley, 1988)*
- *Atomic Energy; Henry DeWolf Smyth, (Princeton U. Press, 1945) (source of the original opening lines of the chorus of Dr. Atomic)*
- *The Nuclear Chain Reaction, 40 Years Later; R.G. Sachs, ed. (UC Press, 1984)*
- *The Manhattan Project; Cynthia Kelly, ed. (Workman, 2007)*
- *..... (lots more, but these will get you a very good start, and will draw you in..)*

# *A little tutorial on basics*

- *The nucleus of an atom is the little (one 'fermi' =  $10^{-15}$  m) positively-charged object in the center of an atom around which the (negative) electrons rush around.*
- *Nuclei are made of protons (+) and neutrons(0); a given element ALWAYS has the same # of protons, but can have different # of neutrons (e.g.  $U^{235}$  and  $U^{238}$ ;  $P^{239}$ ) (explain)*
- *Fission is the process in which a heavy nucleus (e.g. Uranium or Plutonium) splits into 2 lighter nuclei. The sum of the masses of the 2 'daughter' nuclei is less than the 'mother' (why gender-specific language??), and so energy is released in neutrons, photons,  $\alpha$ -particles, ... (our old friend  $E=mc^2$ )*
- *A 'chain reaction' occurs if there are enough neutrons emitted by one fission to make several- these several each make several, and so forth... (exponential growth..-Szilard)*
- *A chain reaction can be designed to level off to be stable- just enough neutrons are made to replenish those absorbed in fission, or can be designed to run-away (and if fast enough, explode). (Smyth report is a good place to read..)*

# *Aside on the Collision of Art and Science*

*Verbatim from page 1 of the Smythe Report- 1945- (the official history)*

## *'THE CONSERVATION OF MASS AND OF ENERGY'*

*'There are two principles that have been cornerstones of the structure of modern science. The first- that **matter can be neither created nor destroyed, but only altered in form-** was enunciated in the eighteenth century and...'*

*Peter Sellars has since changed it in response to a complaint from the APS (a spectacular case of the Spare Parts Theorem?- tension between then and now)*

# The Two Different Paths to Hiroshima and Nagasaki-

- *The Hiroshima bomb was made from a relatively rare (0.7%) isotope of Uranium-  $U^{235}$ . This had to be separated from the dominant (99.3%) isotope  $U^{238}$ .  $U^{235}$  sustains an explosive chain-reaction ( $U^{238}$  doesn't, but see below)- BUT, the 2 isotopes have the same chemical reactions ( $U^{238}$  is heavier, tho not much (238/235), so acts differently under gravity, thermal jostling, electric fields... **Hard to separate!***
- *The Nagasaki bomb was made from Plutonium ( $P^{239}$ ) Plutonium does not occur naturally, but is made in the chain-reaction in a reactor fueled with  $U^{238}$ . Plutonium can be separated from  $U^{238}$  and fission products chemically.*

# *Chicago Cyclotron (later- 47-48)*



*The cyclotron, invented by Lawrence, was one of the keys to separating  $U^{235}$  from  $U^{238}$  for the Hiroshima Bomb*

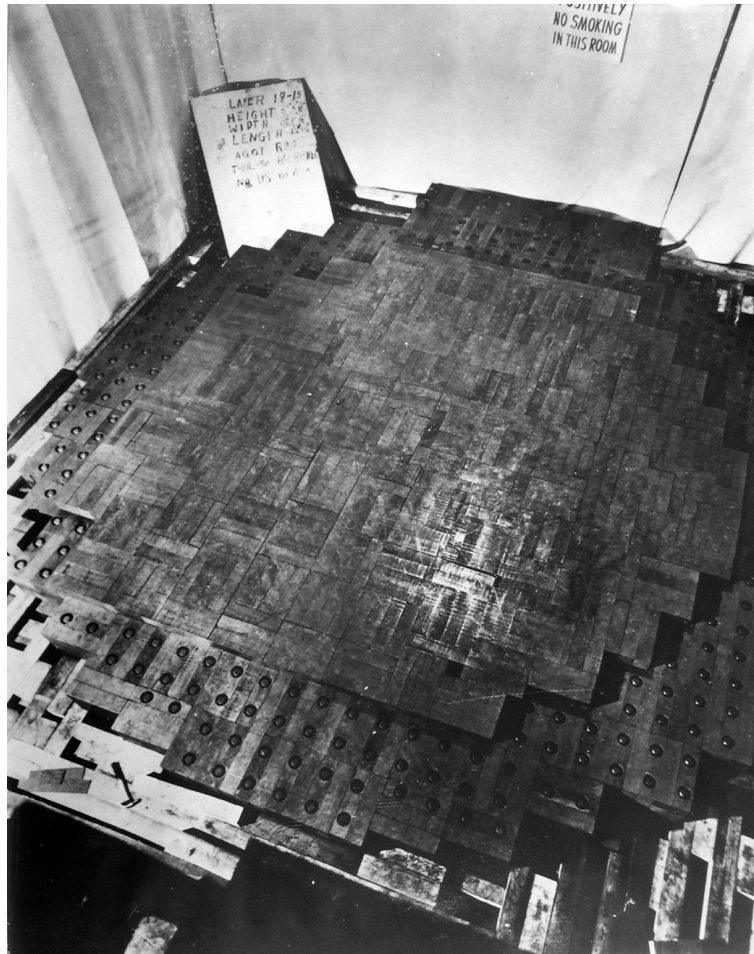
# The Two Different Paths to Hiroshima and Nagasaki-

- *The Hiroshima bomb (U235) was a simple design- a 'gun' bomb that drove ½ of the U235 into the other half. So simple it was never tested- supremely confident it would work first time (Hiroshima).*

*'Most people seem unaware that if separated U-235 is at hand it's a trivial job to set off a nuclear explosion, ... Given a supply of U-235, .., even a high school kid could make a bomb in short order.'*

*Luis Alvarez, 'Alvarez', p. 125*

# *Chicago- the CP1 Pile*



*Stagg Field- the west side of Ellis opposite the Accelerator Building*



# The Two Different Paths to Hiroshima and Nagasaki-

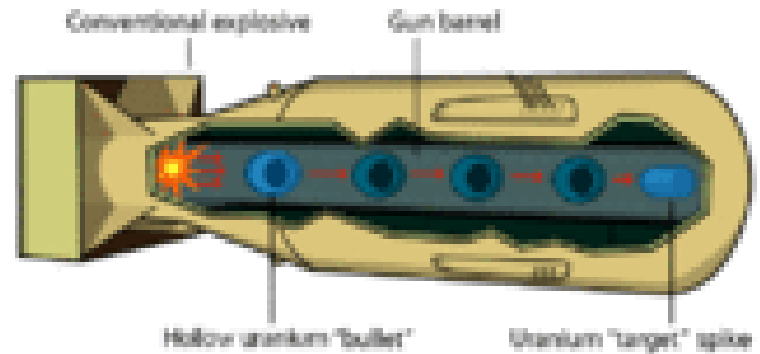
- *'...whereas if only plutonium is available, making it explode is the most difficult technical job I know....'*
- *Luis Alvarez, 'Alvarez', p. 125*
- *The Trinity and Nagasaki bombs were made of Plutonium- easier to make in a pile and chemically extract than to separate U235 from U238. That's 'the Gadget' you'll see tonight.*

*Chicago was in charge of the pile program to make Plutonium- Arthur Holly Compton and the Metallurgical Laboratory. (Ellis Ave)*

*E.O. Lawrence and H. Urey were in charge of isotope separation.*

# *Little Boy*

*From John Coster-Mullens (Wikipedia)*



*The Hiroshima Bomb- U235, simple gun bomb-*

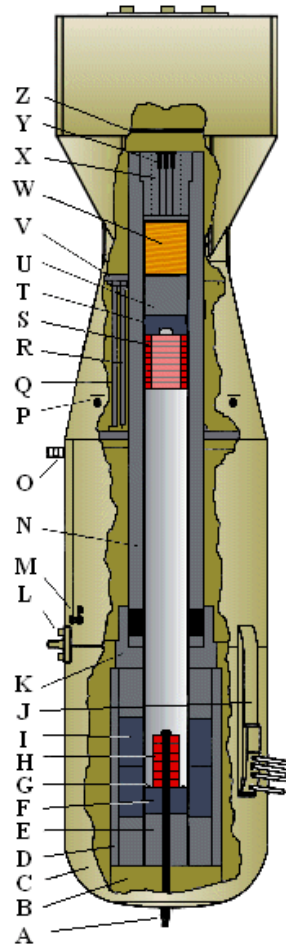
*Never tested (problem was the other way- Deke Parsons armed it in mid-air over concern it would go off too easily if something went wrong)*

# Little Boy How To...

From John Coster-Mullens (Wikipedia)

*Note the given  
dimensions-*

*Also don't need the  
Polonium-Be initiator-  
over-kill (sic)*



Cross-section drawing of Y-1852 Little Boy showing major mechanical component placement. Drawing is shown to scale. Numbers in ( ) indicate quantity of identical components. Not shown are the APS-13 radar units, clock box with pullout wires, baro switches and tubing, batteries, and electrical wiring. (John Coster-Mullen)

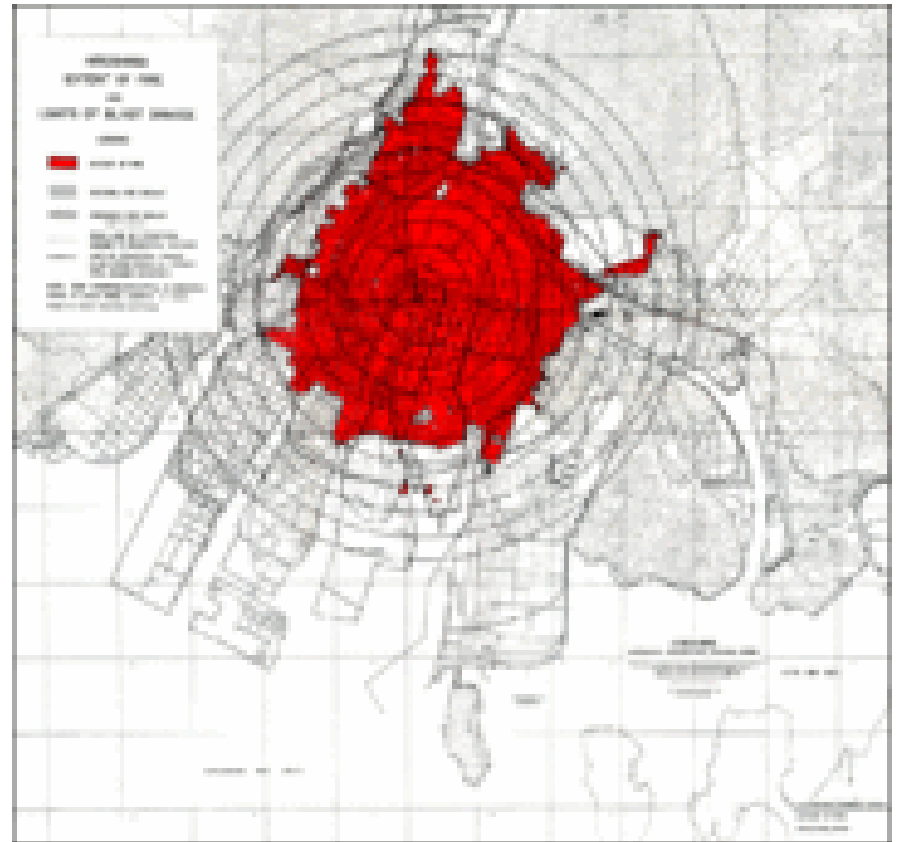
- Z) Armor Plate
- Y) Mark XV electric gun primers (3)
- X) Gun breech with removable inner plug
- W) Cordite powder bags (4)
- V) Gun tube reinforcing sleeve
- U) Projectile steel back
- T) Projectile Tungsten-Carbide disk
- S) U-235 projectile rings (9)
- R) Alignment rod (3)
- Q) Armored tube containing primer wiring (3)
- P) Baro ports (8)
- O) Electrical plugs (3)
- N) 6.5" bore gun tube
- M) Safing/arming plugs (3)
- L) Lift lug
- K) Target case gun tube adapter
- J) Yagi antenna assembly (4)
- I) Four-section 13" diameter Tungsten-Carbide tamper cylinder sleeve
- H) U-235 target rings (6)
- G) Polonium-Beryllium initiators (4)
- F) Tungsten-Carbide tamper plug
- E) Impact absorbing anvil
- D) K-46 steel target liner sleeve
- C) Target case forging
- B) 15" diameter steel nose plug forging
- A) Front nose locknut attached to 1" diameter main steel rod holding target components

"Atom Bombs: The Top Secret Inside Story of Little Boy and Fat Man," 2003, p 112.  
John Coster-Mullen drawing used with permission

*The Hiroshima Bomb-*

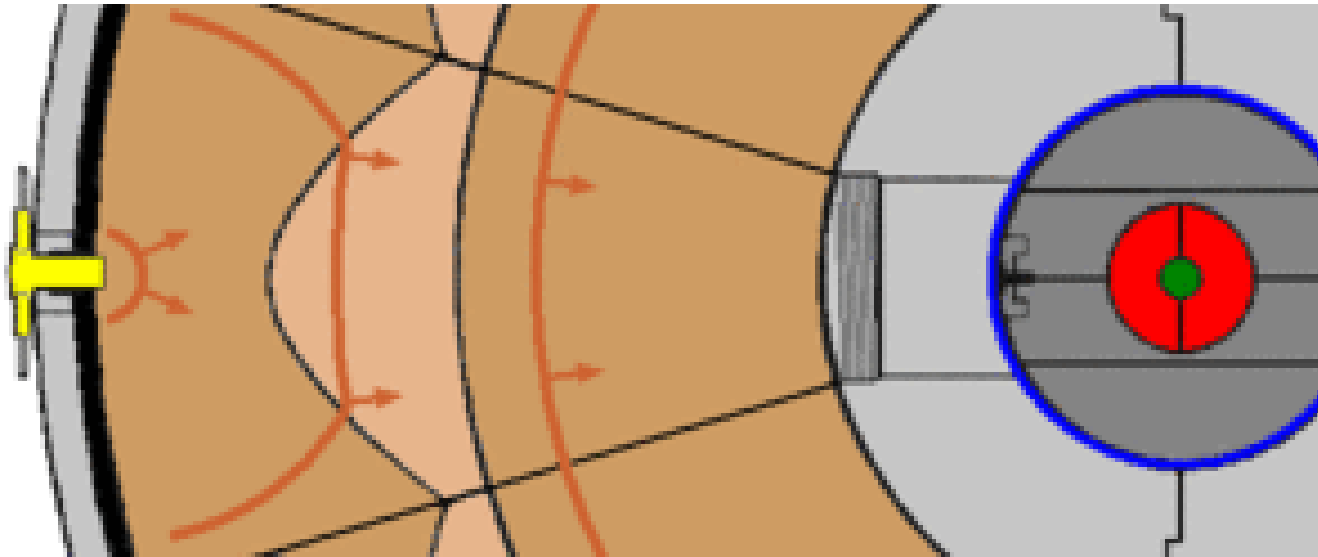
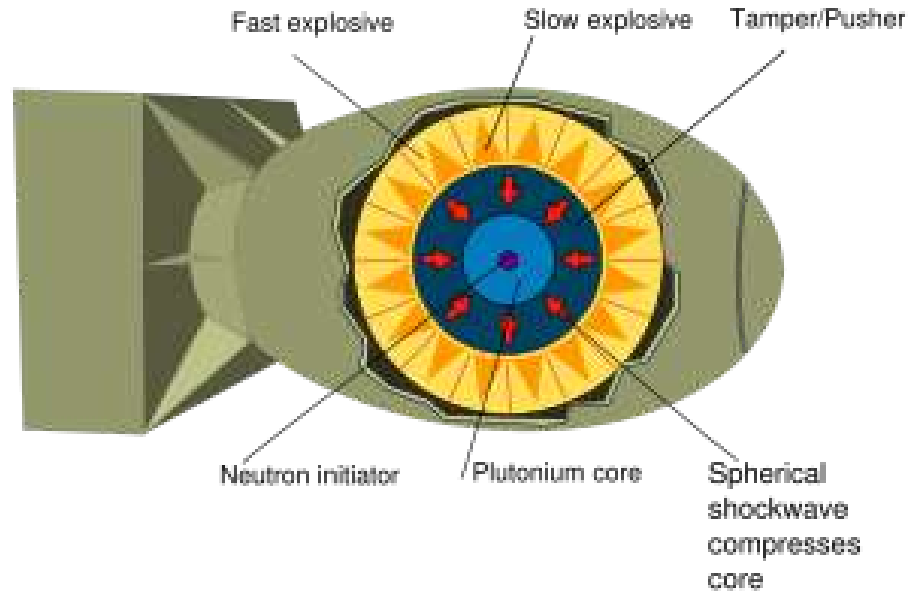
# *Little Boy*

*From Wikipedia*

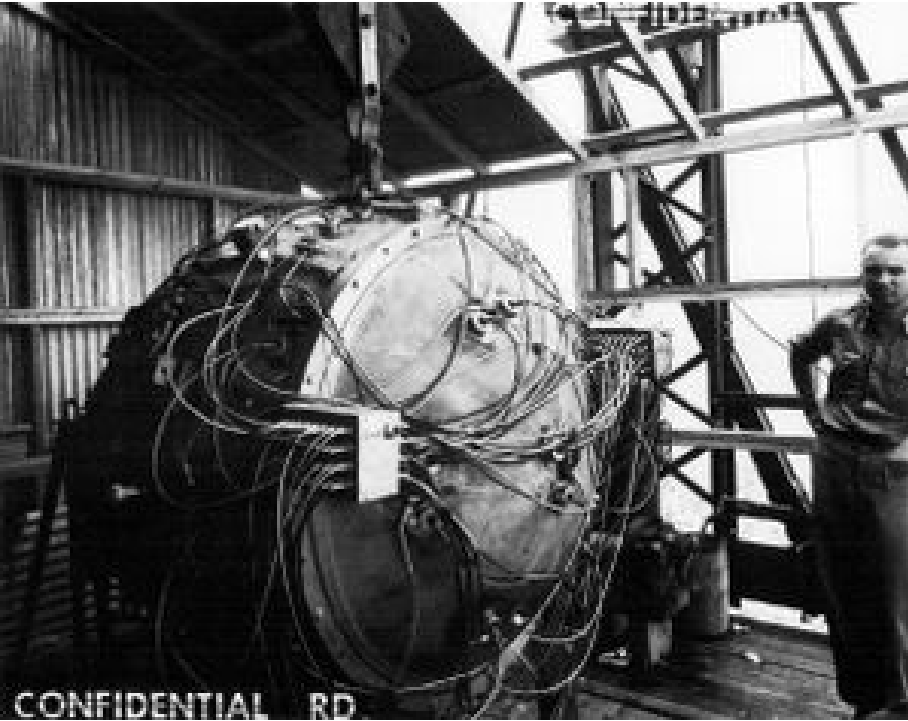


*The Hiroshima Bomb- 8:15am August 6, 1945*

# *The Gadget- Trinity and Fat Man*



# *The Gadget- Trinity*



*The Gadget on the Tower*

*(tell McKibben story?)*

*The Trinity Test*

*July 16, 1945 (my dad saw it- went in afterwards- tell Wilson/Oppie story)*

# *Los Alamos- 2<sup>nd</sup> -Hand*

- *I was delivered by Dr. Jim Nolan (sung by Roger Honeywell- Rocky??). (Nolan story..)*
- *My dad was a grad student at Wisc., working on a Van der Graf under Ray Herb; my mom was (is) a biologist- Herb's group went lock-stock-and-barrel to Los Alamos early 1943 (Hanson story, fly and cauldron, Fermi and balance).*
- *My mom was a 'computer' for Feynman and worked in the blood lab. (tell Kitty badge story)*
- *'Most wonderful group of people...' - e.g. Bob Wilson, Pief, Feynman, Weisskopf, Bethe (tell Bethe/Weisskopf/Pauli story?)*
- *Moral issues complex- Ramsey at Lyric Symposium- Alvarez, my dad,*
- *How did Adams and Sellars get it so right?...*

# *Question (aside- enter paren.)*

- *I've always associated Los Alamos with trains- the Santa Fe SuperChief*

*(and story of Von Neuman, I think it was, losing his car in West Texas?)*

*Q: is the music at the start of Act-1 inspired by the sounds of trains?*

*(exit paren.)*



# *The Joy of Physics*



*E.O. Lawrence, Fermi, and I.I. Rabi*

*(tell Eisenhower, Teller, Rabi story?)*

# *The Sense of Urgency-II*

SCIENTISTS AND PUBLIC POLICY

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They approved the organizing of the society according to the motion of Joe Keller [a member of the first stand-by committee from the meeting of March]. They also discussed what form of statement we should make on the subject to the President and to the government. Several alternatives were suggested and the meeting approved [one]. . . . There have been meetings of the organization approximately weekly since then.

The key paragraphs of the constituent motion by Joe Keller were:

1. We hereby form an organization of scientists, called temporarily, the Association of Los Alamos Scientists.

2. The object of this organization is to promote the attainment and use of scientific and technological advances in the best interests of humanity. We recognize that scientists, by virtue of their special knowledge, have, in certain spheres, special political and social responsibilities beyond their obligations as individual citizens. The organization aims to help carry out these responsibilities by keeping its members informed, and by providing a forum through which their views can be publicly and authoritatively expressed.

The first executive committee was composed of David Frisch, William Higinbotham (chairman), Joseph Keller, David Lipkin, John Manley, Victor Weisskopf, Robert Wilson, and William Woodward. During the next few months these men especially, and their fellow scientists at Los Alamos generally, were faced with the difficulty of translating their technical knowledge into political terms. Knowing what the bomb was, they had to advise an ignorant nation on its use. Capable of manipulating the nucleus of the atom, they now had to deal with the essence of their country's politics. They adopted, insofar as they could, the tactics of professional politicians; yet their first and one of their most effective blows was directed with great accuracy by their instincts as amateurs. They aimed at the President of the United States. Later they went to the Congress as a highly effective people's lobby utilizing traditional political gambits.<sup>3</sup>

The specific issues with which the atomic scientists and the nation were confronted were numerous and complex. As the scientists themselves realized after the Hiroshima and Nagasaki drops, the paramount question was the problem of international control. The remainder of this consideration of the scientists' efforts in politics, therefore, is directed towards the international topic. The events of September, October, and November, 1945, seem to have been crucial and conclusive. Before November had ended, attention was concentrated upon the first Atomic Energy Act of Congress, but that is another story, as is the role of scientists located at other installations, not to be reported here at this time.

*Assn of Los Alamos Scientists-*

*Nov 9, 1945?*

*(Paul Piccard, FSU)*

# Chicago Sense of Urgency

Atomic Bomb: Decision -- The Franck Report, June 11, 1945

<http://www.dannen.com/decision/franck.html>

► UP to [Atomic Bomb: Decision](#)

► UP to [Leo Szilard Online](#)

## The Franck Report, June 11, 1945

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### Report of the Committee on Political and Social Problems Manhattan Project "Metallurgical Laboratory" University of Chicago, June 11, 1945 (The Franck Report)

#### Members of the Committee:

James Franck (Chairman)

Donald J. Hughes

J. J. Nickson

Eugene Rabinowitch

Glenn T. Seaborg

J. C. Stearns

Leo Szilard

**Source:** U.S. National Archives, Washington D.C.: Record Group 77, Manhattan Engineer District Records, Harrison-Bundy File, folder #76.

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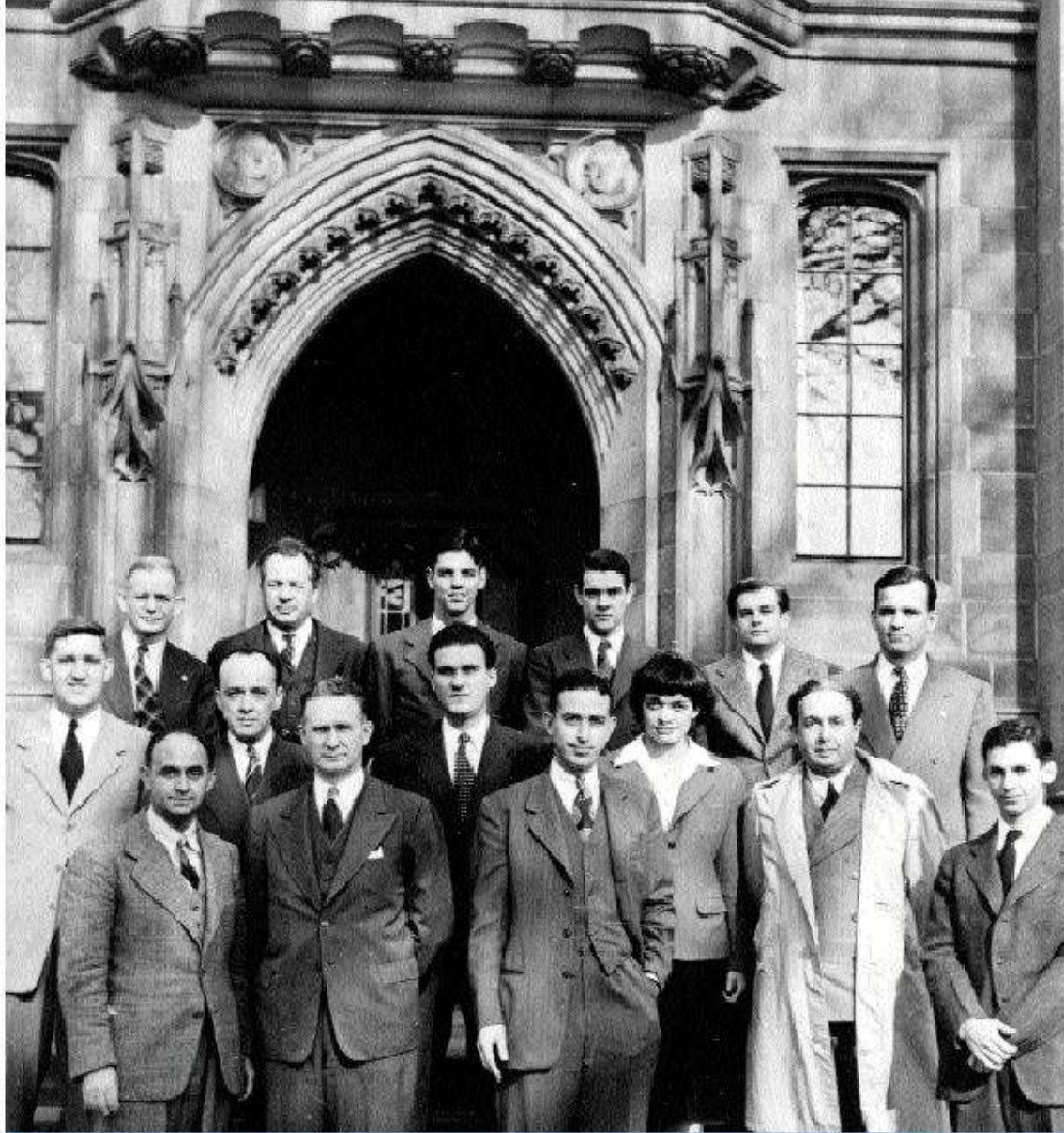
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Order Sec Army By TAG per

**John Simpson told the story of Groves banning meetings of more than 3 scientists when he got wind of the concerns.**



They had a wonderfully absurd notion—that a magazine could save the world. And who is to say they were wrong?

# McMahon Act

atomic energy act 1946

<http://www.rosenbergtrial.org/docs/atomact.html>

## National Committee to Reopen the Rosenberg Case (Atomic Energy Act of 1946)

A BILL

For the development and control of atomic energy  
Be it enacted by the Senate and House of Representatives of the United  
States of America in congress assembled,

### DECLARATION OF POLICY

Section 1. (a) Findings and Declaration. Research and experimentation in the field of nuclear fission have attained the stage at which the release of atomic energy on a large scale is practical. The significance of the atomic bomb for military purposes is evident. The effect of the use of atomic energy for civilian purposes upon the social, economic, and political structures of today cannot now be determined. It is reasonable to anticipate, however, that tapping this new source of energy will cause profound changes in our present way of life. Accordingly, it is hereby declared to be the policy of the people of the United States that the development and utilization of atomic energy shall be directed toward improving the public welfare, increasing the standard of living, strengthening free competition among private enterprises so far as practicable, and cementing world peace.

(b) Purpose of Act. It is the purpose of this Act to effectuate these policies by providing, among others, for the following major programs;

- (1) A program of assisting and fostering private research and development on a truly independent basis to encourage maximum scientific progress;
- (2) A program for the free dissemination of basic scientific information and for maximum liberality in dissemination of related technical information;
- (3) A program of federally conducted research to assure the Government of adequate scientific and technical accomplishments;
- (4) A program for Government control of the production, ownership, and use of fissionable materials to protect the national security and to insure the broadest possible exploitation of the field;
- (5) A program for simultaneous study of the social, political, and economic effects of the utilization of atomic energy; and
- (6) A program of administration which will be consistent with international agreements made by the United States, and which will enable the Congress to be currently informed so as to take further legislative action as may hereafter be appropriate.

### ATOMIC ENERGY COMMISSION

Sec. 2. (a) There is hereby established an Atomic Energy Commission (herein called the Commission), which shall be composed of five members. Three members shall constitute a quorum of the Commission. The President shall designate one member as a Chairman of the Commission.

(b) Members of the Commission shall be appointed by the President, by and with the advice and consent of the Senate, and shall serve at the pleasure of the President. In submitting nominations to the Senate, the President shall set forth the experience and qualifications of each person so nominated. Each member, except the Chairman, shall receive compensation at the rate of \$15,000 per annum; the Chairman shall receive compensation at the rate of \$20,000 per annum. No member of the Commission shall engage in any other

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# John Simpson- UC

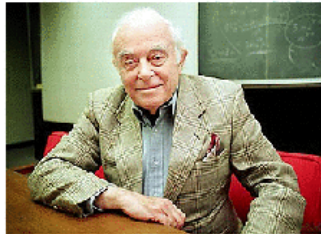
John Simpson talks about our nuclear past and future

<http://chronicle.uchicago.edu/990415/simpson.shtml>

THE UNIVERSITY OF  
**CHICAGO**  
**CHRONICLE**

April 15, 1999  
Vol. 18 No. 14

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*John Simpson, the Arthur Holly Compton Distinguished Service Professor Emeritus in Physics, recently received the 1999 Leo Szilard Lectureship Award. Simpson worked as a scientific group leader for the Manhattan Project, for which Szilard was a leading scientist. Always advocating civilian control of nuclear power, Simpson organized and received approval for meetings to take place in Ryerson Physical Laboratory during the atomic research on the University campus in 1945.*

## John Simpson talks about our nuclear past and future

By **Steve Koppes**  
*News Office*

A noted Chicago space scientist who also worked on the Manhattan Project urges further development of safe nuclear reactors that could both meet a growing energy demand and reduce the risk of nuclear fuel proliferation for military applications.

"The world is not going to wait around for the United States to phase out of nuclear energy," said John Simpson, 82, the Arthur Holly Compton Distinguished Service Professor Emeritus in Physics. Simpson has made many discoveries regarding the solar system and served as a scientific group leader in the Manhattan Project from 1943 to 1946.

"Developing nations represent 90 percent of the world's population and they are going to go nuclear. We have to face that fact. Either we get in there and help lead the way, or we are going to be left hopelessly behind during the next century, unable to influence the rest of the world," said the Chicago physicist.

Simpson's comments came during an interview before he delivered the Leo Szilard Lecture Thursday, March 25, at the American Physical Society's Centennial Meeting in Atlanta. On the previous Wednesday, the society presented the 1999 Leo Szilard Lectureship Award to Simpson for his leading role in educating scientists, members of Congress and the public on the importance of civilian control of nuclear policy. The award also cites his critical efforts as an organizer

Note Clock has Moved since this picture! (2 min closer)



**The Bulletin of Atomic Scientists,  
The University of Chicago (1945)**



## CHICAGO ACTIVITIES . . .

### A Book On The A-Bomb In Preparation

A number of scientists prominently associated with the production of the bomb — Oppenheimer, Morrison, Satterly, Tref, Wigner, among others — are writing chapters for a book on the atomic bomb and its implications. Experts outside the project are contributing material on radar defense, dispersal of cities, ability of other countries to produce bombs, etc. The first part will contain authoritative presentation of all the relevant facts and will be directed at the intelligent layman. This is to be followed by a shorter analytical discussion of the implications of various international policies. This book — which is largely due to the initiative of Miss Katherine Way — is to be ready by the end of January, and will be issued by a well-known firm in a paper-board edition to sell for a dollar.

### Speakers' Bureau

During October, November and the first week in Dec., 1945, the Bureau has sponsored over forty lectures, Kiwanis and Lions Clubs, scientific clubs and organizations, church groups, fraternal organizations, unions, and lawyers' groups are a few of the types of groups contacted in this manner.

The usual size of audience has been about 30-75 persons, but a number of lectures to audiences of hundreds or a thousand have been given and are being planned in the near future.

The majority of the speeches have been presented in the vicinity of Chicago. However, there has been planned through the Council on Foreign Relations, Inc., a series of discussions with leading citizen groups in key cities from coast to coast. These will be given during December and the cooperation of speakers from all the sites has been

### MATERIALS COMMITTEE

Our early discussions were summarized in a series of statements, on such subjects as secrecy, defense, and necessity of international control, which were written by various members of the A. S. C. and utilized in a number of press releases issued during September and October. These early statements were the basis of an article published in the October 29th issue of "Life".

During the last six weeks the Materials Committee has prepared:

1) Press releases designed to correct certain erroneous statements appearing in the public press.

2) A series of about 10 articles of about 1000 words each, planned for release through the press services.

3) A series of educational pamphlets on a popular level. Three of these are now complete — "One Minute War", "Abandoned Cities," "World War III — The Atomic War".

4) An informative booklet on the scientific aspects of atomic energy, designed for public officials.

### Records Committee

The Records Committee has set up the library of the A.S.C. in Ryerson 253. The material includes:

1) Clipping files of newspapers, magazines, etc. (Chicago Sun, Chicago Tribune, Chicago Daily News, Chicago Times, New York Times, Christian Science Monitor, P.M. others).

2) Complete file of the Congressional Record.

3) Collection of miscellaneous statements issued by the A.S.C. and other organizations, speeches given by A.S.C. members and others, and letters.

The Records Committee also distributes documents which have been duplicated. Requests should be directed to

### OFFICE OF ENQUIRY OF THE UNIVERSITY

Aside from the activities of the Atomic Scientists of Chicago, the University of Chicago itself has been giving its attention to the political problems of atomic energy.

Two of the University's Radio Round Tables were devoted to the atomic bomb. Chancellor Hutchins, Vice President Gustafson and Prof. Ogburn participated in the first and Prof. Robert Redfield, Dean of Social Science Division, together with Chancellor Hutchins and Vice President Gustafson, in the second.

The University has held two conferences on the Control of Atomic Energy; one at the University in September, and another in November at Rye, N.Y. The conferences were attended by leading physical scientists, economists, jurists, governmental officials and publicists. The Rye conference adopted a Resolution on the Control of Atomic Energy which was sent to the President, the Cabinet, and all members of Congress.

An Office of Enquiry into the Social Aspects of Atomic Energy has been created by the University and will undertake the production of monographs on the social, political, and economic problems connected with atomic energy. A number of preliminary memoranda have already been prepared. Dean Redfield is serving as Director of the Office.

The University Council — the ruling body of the University Faculty — has adopted a resolution on the control of atomic energy which has been sent to the President, the Cabinet, and all members of Congress.

Profs. Redfield, Shils and Levi have been speakers at general meetings of the ASC and Prof. Wirth has given valuable advice on educational matters.

### I. C. C. Science Section



# Plans for Nuclear Research in U.S. . . .

## The Argonne National Laboratory . . .

The successor of the Metallurgical Laboratory, one of the most important branches of the Manhattan Project, is the Argonne National Laboratory, so called after the Argonne Forest. Preserved 30 miles west of Chicago, the location of one part of the Metallurgical Laboratory including the piles and necessary installations.

The Argonne National Laboratory has been established and is being supported by the Federal government. It is managed and operated by the University of Chicago as Contractor. Its administrative organs are a Council of Participating Institutions, a Board of Governors and the Director.

The Participating Institutions are twenty-five of the leading Universities and Research Institutes in the middle west. The charter members are:

Battelle Memorial Institute, Carnegie Institute of Technology, Case School of Applied Science, Illinois Institute of Technology, Indiana University, Iowa State College, Mayo Foundation, Michigan State College, Northwestern University, Notre Dame University, Ohio State University, Purdue University, St. Louis University, Washington University, Western Reserve University, University of Chicago, University of Cincinnati, University of Illinois, University of Iowa, University of Michigan, University of Minnesota, University of Missouri, University of Nebraska, University of Pittsburgh, University of Wisconsin.

Other institutions which, because of research interest, qualified personnel and geographical location, find it possible and to their advantage to take an active and constructive part in the cooperative pro-

Chancellor A. H. Compton—Washington University

Prof. J. W. Loomie—University of Illinois

Dean J. T. Tate—University of Minnesota

Prof. E. H. Snodgrass—Iowa State College

The Director is Prof. Walter H. Zinn, formerly Director of the Argonne Laboratory under the Metallurgical Project. Drs. Norman Hilberry and Harvard I. Hall have been appointed Associate Directors.

The Director and the scientific staff of the Laboratory will have full responsibility for the formulation of the research program. When approved by the Board and the Government, the detailed implementation of the approved program will be the responsibility of the Director and the Contractor.

The scientific staff of the Laboratory will be made up of two classes (a) temporary staff members, and (b) regular staff members. Both classes will have the same opportunities for use of the Laboratory facilities in research upon approved programs, and both classes will be required to abide by the operating rules of the Laboratory.

Temporary staff membership is not limited to the staff members of the Participating Institutions. The Director may appoint any qualified scientist to temporary staff membership.

In order to achieve the objectives of the Laboratory, it is essential that it have in addition to its permanent staff a great

research institution to underwrite, or involving health hazards requiring the special facilities and services of the Laboratory. As a general policy, major duplicating research programs will not be encouraged at the Laboratory if suitable personnel and facilities are actively engaged in such programs at an associated institution, although individual members of the staff may be concerned with such problems and will be expected to carry on some work in such fields.

In addition to the scientific work carried on by the regular staff of the Laboratory, investigations may be arranged on a cooperative basis with the scientific staffs of the Participating Institutions as represented by the Council, or with qualified scientific investigators from other institutions.

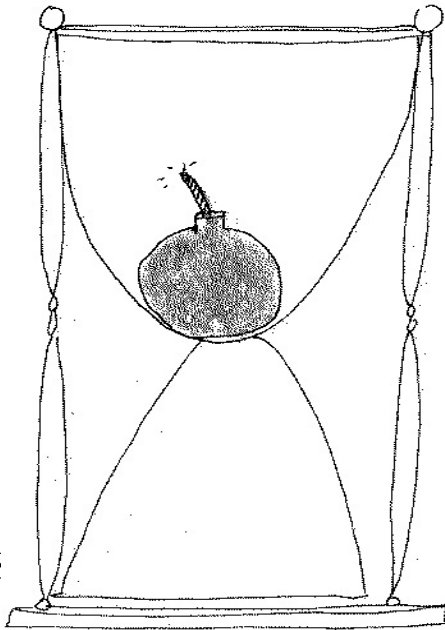
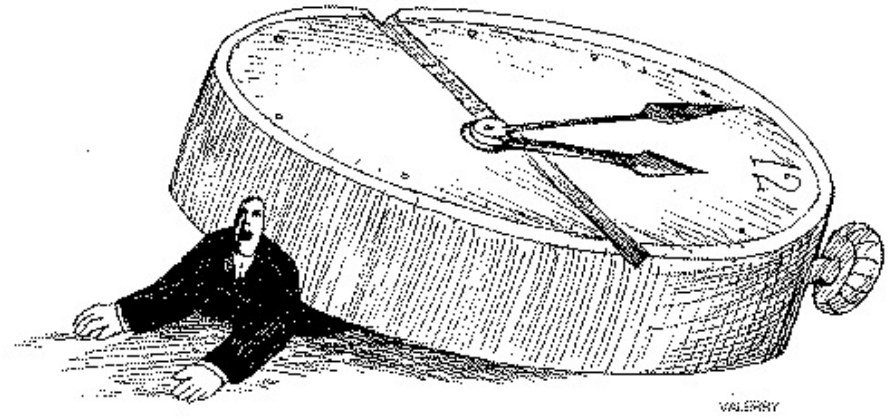
The research programs will emphasize work in nuclear physics and chemistry and in those phases of the physical, biological, and engineering sciences which are of interest to the Atomic Energy Project and will include such other investigations as the Director, the Board of Governors, and the Government may approve as appropriate and to peculiar requirements for use of special Laboratory facilities.

It is anticipated that all final results of the Laboratory may be published in detail in suitable government journals; work may be classified or unclassified as the nature of the work and national security policy dictates. It is further anticipated that such unclassified government publication will be given wide distribution and that such classified government publication

# *'It hasn't ended yet..'*

- *My reading of the meaning of the Bulletin's Clock is that since Trinity we no longer have lots of time- full-scale on the clock is just 15 minutes to midnight. We have yet to solve the danger- we are running out of time..(M. Ayme')*
- *Dr. Atomic also doesn't have an ending – they too are waiting as the curtain comes down...*
- *With the resurgence of nuclear power we need a resurgence of the urgency felt by Oppie, Wilson, Simpson, Levi, Shils, and others... U235 is too easy, and it's out there, and now, others have the technology... once there's lots of 235 out there, 'any high school kid..'*
- *We're at the UC GSB- what's it worth to us to remove the risk? (Chicago School of Economics)*
- *Peter Sellar's definition of tragedy....*

# The Clock Remains an Internationally Known Symbol



01/18

Richard Clise, United States

UC Dr. At



*THE END*

# Continuing Concern...

March  
1950,  
Vol 6,  
No. 3  
(3 min to  
Midnight)

01/18/08

## WHAT THE SCIENTISTS ARE SAYING

### Arms Can Bring No Security

Albert Einstein



**T**HE idea of achieving security through national armament is, at the present state of military technique, a disastrous illusion. On the part of the United States this illusion has been particularly fostered by the fact that this country succeeded first in producing an atomic bomb. The belief seemed to prevail that in the end it were possible to achieve decisive military superiority.

In this way, any potential opponent would be intimidated, and security, so ardently desired by all of us, would be brought to us and all of humanity. The reason which we have been following during these last five years has been, in short: security through superior military power, whatever the cost.

This mechanistic, technical-military, psychological attitude had inevitable consequences. Every angle set in foreign policy is governed exclusively by one viewpoint.

How do we have to act in order to achieve utmost superiority over the opponent in case of war? Establishing military bases at all possible strategically important points on the globe. Arming and economic strengthening of potential allies.

Within the country—concentration of tremendous financial power in the hands of the military, militarization of the youth, close supervision of the loyalty of the citizens, in particular, of the civil servants by a police force growing more conspicuous every day. Intimidation of people of independent political thinking. Indoctrination of the public by radio, press, school. Growing restriction of the range of public information under the pressure of military secrecy.

The armaments race between the USA and the USSR, or generally supposed to be a preventive measure, assumes hysterical character. On both sides, the races to mass destruction are conducted with feverish haste—behind the respective walls of secrecy. The H-bomb appears on the public horizon as a probably attainable goal. Its

accelerated development has been solemnly proclaimed by the President.

If successful, radioactive poisoning of the atmosphere, and hence annihilation of any life on earth, has been included within the range of technical possibilities. The ghostlike character of this development lies in its apparently compulsory trend. Every step appears as the unavoidable consequence of the preceding one. In the end there looms more and more clearly general annihilation.

Is there any way out of this impasse created by man himself? All of us, and particularly those who are responsible for the activities of the U. S. and the USSR, should realize that we may have relinquished an eternal enemy, but have been incapable of getting rid of the mentality created by the war.

It is impossible to achieve peace as long as every single action is taken with a possible future conflict in view. The leading point of view of all political action should therefore be: What can we do to bring about a peaceful co-existence and even loyal cooperation of the nations?

The first problem is to do away with mutual fear and distrust. An armament race is a continuation of violence (not only with respect to means of mass destruction) is undoubtedly necessary.

Such renunciation, however, can only be effective if at the same time a supra-national judicial and executive body is set up empowered to decide questions of immediate concern to the security of the nations. Even a declaration of the nations to collaborate loyally in the realization of such a "restricted world government" would considerably reduce the imminent danger of war.

In the last analysis, every kind of peaceful cooperation among men is primarily based on mutual trust and only secondarily on institutions such as courts of justice and police. This holds for nations as well as for individuals. And the basis of trust is loyal give and take.

What about international control? Well, it may be of secondary use as a police measure. But it may be wise not to overestimate its importance. The times of prohibition came to mind and give one pause.

### Back to the Laboratories

Edward Teller

**P**ROBABLY NO MAN has announced that we are going to make a hydrogen bomb. No one connected with work on atomic bombs can escape a feeling of grave responsibility. No one will be kind to discover more fuel with which a coming conflagration may be fed. But scientists must find a modest way of looking into an uncertain future. The scientist is not responsible for the laws of nature. It is his job to find out how these laws operate. It is the scientist's job to find the ways in which these

laws can serve the human will. However, it is not the scientist's job to determine whether a hydrogen bomb should be constructed, whether it should be used, or how it should be used. This responsibility rests with the American people and with their chosen representatives.

Personally, as a citizen, I do not know in what other way President Truman could have acted. As a scientist, I am troubled by other questions, more limited, more specific, but not less urgent and not less harassing. Can

**1992:Vannevar Bush  
Backs the bomb**

**1998: Terrorism's  
New Breed**

*1990: The H-bomb:  
Who really gave  
Away the secret?*

**2000: New Nuke Chorus Tunes up**

**1992: Cuba's  
Double Jeopardy**

*1997: A Chemical  
Weapons Atlas*

**1990:  
Poisoned Pacific:  
The Legacy of French  
Nuclear Testing**

**2002: Donde esta  
La Frontera?**

**1996: Tomorrow.  
A Eurobomb**

**2000:  
The Oops List**

*1995: An  
Iranian Bomb?*

**1993: Did Nukes  
Nudge the PLO**

*1991: Iraq's Nuclear  
Hide-and-Seek*

**2004: Defusing the Nuclear Middle East**

**1996: Africa  
Bans the bomb**

**1994: South Africa and  
The affordable bomb**

**2003: Chinese  
Nuclear Forces**

*1992: Pakistan's  
Bomb: Out  
of the Closet*

**1992: India's  
Silent Bomb**

**2001: Japan's  
Nuclear  
Twilight Zone**

**1991: Plutonium  
in North Korea**

**2000: Echelon**