



## Course Information – CHEM 195 – THE NUCLEAR AGE



### Goals and Objectives

This seminar reviews the science and technology leading to the development and production of the atomic bomb. With this background, students then examine the decision to use the bomb against Japan as well the political, economic, social, and environmental legacies of this weapon. Students write analyses of the chapters in Rhodes and respond to topics on the Blackboard Discussion Board. These written responses will form the basis for group discussions throughout the seminar. Each student will also select a topic relating to a nuclear issue, obtain the instructor's approval, and prepare a term paper and presentation on the topic.



### Policies and Procedures

Written and oral assignments:

You are expected to complete reading assignments by the designated discussion (seminar) meetings. You should come to the seminar prepared to discuss topics of interest from the assignments. The assigned chapter analyses will assist you in preparing for this discussion. You should also prepare informal notes on these topics to assist you.

For each chapter in Rhodes complete the following analysis (Please include the page numbers for each entry):

- 1)A paragraph summarizing the chapter.
- 2)Main characters
- 3)Significant political and social events
- 4)Significant scientific/technical discoveries
- 5)Important locations

The time line feature and biographies on the [atomicarchive.com](http://atomicarchive.com) site will be helpful. The instructor will ask you to submit your chapter analyses chapter electronically for grading each Monday (see assignments section).

You are also expected to participate in the Blackboard Discussion Board as assigned. This means writing short responses to issues presented as forum topics on the Discussion Board.

A final paper (10 to 15 single spaced pages not including figures or 2500 to 4000 words) is due on the last day of the seminar. It must contain a minimum of 15 properly referenced sources. Choose topic relating to the atomic bomb that interests you.

>You need to have this topic approved by the instructor by the end of the fourth week of the course.

>A week later (end of the fifth week), a detailed outline of your paper is due.

>At the end of the ninth week a rough draft of the paper for review by one of your peers is due.

>You will also be expected to make an oral Power Point presentation (10 minute talk - 5 minutes for questions) of highlights from this paper during the last week of the course.



### Required Texts

Rhodes, R., "The Making of the Atomic Bomb"; Simon & Schuster, Inc.: New York, 1986.



### Web Links

[Alsos Digital Library for Nuclear Issues](#)

This library consists of indexed, annotated references to the origins, implementation, and

legacies of the Manhattan Project. It is the most valuable resource for this course.

#### [Atomic Archieve Site](#)

Excellent general information on a variety of subjects on nuclear science and related issues. Also links to other Web sites. Good supplement to the "Atomic Archive" CD.

[Nuclear Pathways](#) Links to information on five websites dealing with nuclear issues.

#### [Chart of the nuclides](#)

Chart containing all isotopes (stable and radioactive) of all the known elements. Contains information on nuclide such as half live, cross section for neutron capture, and decay scheme for radioactive nuclides

#### [Periodic chart of the chemical elements](#)

Clicking on a symbol provides more detailed information about the element.

#### [Primary Doucments on Nuclear Issues from 1928 to the Present](#)

This site contains a collection of original documents collected by the Nuclear Age Peace Foundation.

#### [Nuclear Age Time Line](#)

Excellent chronology of nuclear events and their relation to world history. Site contains links to specific nuclear events and is maintained by the Nuclear Age peace Foundation.



### **Grading Policies**

Rhodes Chapter notes **(20 points)**

Responses to Discussion Boards and class participation **(15 points)**

Science quiz **(5 points)**

Final Paper **(50 total points)**

Outline and preliminary bibliography (10 points)

Initail draft (10 points)

Peer review (5 points)

Final paper (25 points)

Final presentation **(10 points)**



### **[Avoiding Plagiairism](#)**

W&L students frequently express concerns about inadvertently committing plagiarism, described in the *2003-2004 Student Handbook* as "the use of another's words or ideas without proper acknowledgement." The resources listed in this URL should be considered as sources of advice about what constitutes plagiarism and how to avoid it.



### **[The Citation Machine](#)**

Citation Machine is an interactive Web tool designed to assist in modeling the proper use of information property. You merely...

1. Click the type of resource you wish to cite,

2. Complete the Web form that appears with information from your resource, and
3. Click **Make Citations** to generate standard MLA citations.



## Decay schemes for Uranium and Thorium

[THE NUCLEAR AGE \(NUCLEAR AGE\)](#) > [COURSE DOCUMENTS](#)

[EDIT VIEW](#)



## Syllabus



### Lesson #1: Scientific Foundations (1895-1938)



### Lesson #2: Potential for explosions - nuclear and political (1938 to 1941)



### Lesson # 3: The Manhattan Project (1942-1945)



### Lesson #4: Success at last (1945)



### Lesson #5: The World After Hiroshima



### Lesson # 6: The Hydrogen Bomb and a Nuclear Confrontation



### Lesson #7: The Bomb in the Arts and Film



### **Student Presentations**

Ten to 15 minute presentation by each student of a topic of interest from their final paper.

[THE NUCLEAR AGE \(NUCLEAR AGE\)](#) > [COURSE DOCUMENTS](#) > [LESSON #1: SCIENTIFIC FOUNDATIONS \(1895-1938\)](#)

[EDIT VIEW](#)



## Lesson #1: Scientific Foundations (1895-1938)



### **The Foundations of nuclear science**

[Introduction](#) (56 Kb)

Dr. Settle's notes on the early days of nuclear science from the discovery of uranium in 1789 to the discovery of the neutron in 1932.



### **The chronology of the development of nuclear science**

[Outline of major scientific events leading to fission \(1789 to 1941\)](#) (52 Kb)

[integphysicschem.ppt](#) (52 Kb)

Events showing how the integration of physics and chemistry led to the development of nuclear science.



### **History of Nuclear Science 1895 to 1990s**

Dr. Settle's Powerpoint presentation of this history at L:\Departments\CHEM\chem 195 2007\History



### **Original papers from early research in nuclear science**

<http://webserver.lemoyne.edu/faculty/giunta/papers2.html#radioactivity>

Copies of original papers describing early research in nuclear science. Pick one of these dated before 1932 as the subject of your first forum discussion.



### **Nuclear Radiation Fundamentals**

[Fundamentals.ppt](#) (180.5 Kb)

Review of fundamentals of nuclear radiation that includes useful definitions and examples.



### **Decay schemes for Uranium and Thorium**

This interactive website allows the user to select a radionuclide (radioactive isotope) of an element and follow its radioactive decay to a stable (non-radioactive nuclide) isotope. The emissions (particles and radiation) and half-lives of each nuclide in the decay scheme are presented dynamically. The Java applet uses the *Universal Nuclide Decay Chart* developed for the Institute for Transuranium Elements in Karlsruhe, an Institute of the Joint Research Centre of the European Commission by Dr. Joseph Magill. It provides an excellent introduction to the decay of radionuclides.



### **The Rise of Hitler and the Nazis**

This paper provides background information on the environment in Germany between World War I and World War II. Describes the environment in which scientists worked.

(L:\Departments\CHEM\chem 195 2007\Interwar Period Astore)



### **The Protocols of the Elders of Zion**

[Links to the "Protocols of the Elders of Zion"](#)

Links to several definitive websites on this anti-Semitic work discussed in chapter 7 of Rhodes.



### **The neutron and beyond**

[The neutron and beyond \(1932 to - present\) - Dr. Settle](#)

An extensive website containing the history of nuclear weapons and reactors beginning with the discovery of the neutron.



### **Wilhelm Rontgen and X-rays**

[Links to Rontgen at this web site](#)



### **Henri Becquerel and radioactivity**

[Brief history of discovery of radioactivity by Becquerel](#)



### **Marie and Pierre Curie**

[Links to the Curies](#)



### Ernest Rutherford - Lord of the Cavendish Laboratory

[Links to Lord Rutherford](#)



### Niels Bohr - The Gentle Dane

<http://www.nbi.dk/NBA/lists.html#bohr>

Link to the Niels Bohr archives containing papers by and about Bohr.



### Leo Szilard - Rhodes' protagonist

<http://www.dannen.com/szilard.html>

This site contains information on Leo Szilard, the protagonist in "The Making of the Atomic Bomb".



### Short Biographies of Nuclear Scientists

This folder contains the biographies and photographs of many of the players in the Rhodes book. Useful for keeping up with the characters in the book.

L:\Departments\CHEM\chem 195 2006\Univ 200 - Chem195\course content\Famous Scientists

OK

[THE NUCLEAR AGE \(NUCLEAR AGE\)](#) > [COURSE DOCUMENTS](#) > LESSON #2: POTENTIAL FOR EXPLOSIONS - NUCLEAR AND POLITICAL (1938 TO 1941) [EDIT VIEW](#)



## Lesson #2: Potential for explosions - nuclear and political (1938 to 1941)



### The Neutron and Beyond

This website provides the scientific and technical history of nuclear weapons and reactors beginning with the discovery of the neutron.



### The Frisch-Peierls Memorandum

[FPmemo.PDF](#) (56.951 Kb)



### Sachs' cover letter for Einstein's letter to FDR

Copy of the cover letter dated October 11, 1939, that Alexander Sachs attached to Einstein's famous letter dated August 9, 1939, to President Roosevelt.

<http://www.fdrlibrary.marist.edu/psf/box5/a64b01.html>



### Einstein's (Szilard's) letter to Roosevelt

Copy of letter that initiated the U.S. atomic bomb project.



### Diagrams and chart for nuclear fission

[Fission Information](#) (1.708 Mb)

This Word file contains two diagrams and a link to a chart of the nuclides to help you understand nuclear fission.

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[THE NUCLEAR AGE \(NUCLEAR AGE\)](#) > [COURSE DOCUMENTS](#) > LESSON #2: POTENTIAL FOR EXPLOSIONS - NUCLEAR AND POLITICAL (1938 TO 1941) [EDIT VIEW](#)



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[THE NUCLEAR AGE \(NUCLEAR\\_AGE\)](#) > [COURSE DOCUMENTS](#) > LESSON #4: SUCCESS AT LAST (1945)

[EDIT VIEW](#)



## Lesson #4: Success at last (1945)



### **Spring/summer 1945** (0 Kb)

Time line showing the events surrounding the bombings of Hiroshima and Nagasaki.



### **Truman's speech to American People on August 9, 1945**

<http://www.lib.msu.edu/digital/vincent/findaids/TrumanHS.html>

Radio report to the American people on the Potsdam conference and dropping of the atomic bomb on Hiroshima, Japan.



### **The Official Website of Brig. Gen. Paul Tibbets, Pilot of the Enola Gay**

This site presents the bombings of Hiroshima and Nagasaki from General Tibbets' perspective.



### **Hiroshima A-Bomb Museum**

A virtual museum with exhibits depicting the results of the bombing of Hiroshima in photographs, survivors stories, etc.

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[THE NUCLEAR AGE \(NUCLEAR\\_AGE\)](#) > [COURSE DOCUMENTS](#) > LESSON #5: THE WORLD AFTER HIROSHIMA

[EDIT VIEW](#)



## Lesson #5: The World After Hiroshima



### Events of the Spring and Summer of 1945

[spring-summer 45.ppt](#) (69.5 Kb)

Timeline of events leading to Hiroshima and Nagasaki



### Reactions to Hiroshima and Nagasaki

[Counternarrative](#) (28.5 Kb)

Dr. Settle's notes on Hersey's "Hiroshima", Norman Cousins's editorial, and the US government's response.



### The McMahon Bill

[The McMahon Bill 1.doc](#) (29 Kb)

The bill introduced in December 1945 by Senator Brian McMahon which created the U. S. Atomic Commission to transfer the Manhattan Project from the military to civilian control.



### Control of Nuclear Weapons 1945 - 1949

[Bombcontrol.doc](#) (156 Kb)

Dr. Settle's notes



### Interview with Norman Cousins

[A conversation with Norman Cousins](#)

A 1984 interview with Norman Cousins on the use of the atomic bombs against Japan.



### Stalin's Bomb Maker

[The Russian Atomic Bomb](#)

This site presents the Russian Bomb program through the life of Igor Kurchatov, the physicist in charge of the program. Supplements the video used in the course.



### Short History of the Soviet Bomb Program

[russianbomb.doc](#) (26.5 Kb)

Dr. Settle's notes



### U.S. vs. Soviet Nuclear Programs

[compUSUSSR.doc](#) (1.579 Mb)

A comparison of U.S. and Soviet nuclear facilities.



### Nuclear Age Time Line

Excellent description of nuclear events and their relation to world history. The time line contains links to sites that provide detail on these events. This site is sponsored by the Nuclear Age Peace Foundation

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[THE NUCLEAR AGE \(NUCLEAR AGE\)](#) > [COURSE DOCUMENTS](#) > LESSON # 6: THE HYDROGEN BOMB AND A NUCLEAR CONFRONTATION [EDIT VIEW](#)



## Lesson # 6: The Hydrogen Bomb and a Nuclear Confrontation



### The first atomic bombs

Descriptions of the uranium-235 and plutonium-239 bombs dropped on Japan.



### Nuclear weapons

[Nuclear Weapons.doc](#) (2.748 Mb)

Dr. Settle's notes on nuclear weapons



### Nuclear Weapons

Section on nuclear weapons from the Federation of American Scientists site.



### **Nuclear weapons delivery systems**

[Delivery systems](#) (1.305 Mb)



### **Delivery Systems**

An article on the proliferation of delivery systems from the Federation of American Scientists.



### **Race for the Super.**

[Race for the Super](#)

The site for background materials to accompany the PBS video. Includes maps and a timeline of events leading to the hydrogen bombs.



### **The Hydrogen Bomb**

[hbomb.ppt](#) (471 Kb)

Diagram and equations for a thermonuclear weapon.



### **Dr. Settle's notes on the Cuban Missile Crisis**

[Cuban Missile Crisis.doc](#) (43.5 Kb)



### **Cuban Missile Crisis**

Two websites with materials focusing on the Cuban Missile Crisis

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[THE NUCLEAR AGE \(NUCLEAR\\_AGE\)](#) > [COURSE DOCUMENTS](#) > LESSON #7: THE BOMB IN THE ARTS AND FILM

[EDIT VIEW](#)



## **Lesson #7: The Bomb in the Arts and Film**



### **Allan Ginsberg and Greg Corso**

Site contains brief biographies and poems of these two "beat" poets.



### **Plutonium Ode read by Alan Ginsberg**



### **Bomb by Greg Corso**



### **Threnody for the Victims of Hiroshima**

[Threnody to the Victims of Hiroshima.doc](#) (47 Kb)



### **Nuclear Art**

Power point presentation of different art forms inspired by nuclear explosions.

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### **Black Rain (the film)**

Reflections on Hiroshima and Nuclear War in Japanese Film by Robert Feleppa



### **Dr. Strangelove**

This essay places Stanley Kubrick's classic 1964 film, *Dr. Strangelove* in its historical and cultural perspective.



## **Assignments**



### **Remarks on schedule**

This schedule will be updated as we proceed through the term. Please check it periodically for new information



### **Scientific Foundations (1895-1938)**

X-rays, radioactivity, atomic structure, the nucleus, the neutron, European and U.S. science

Assignment:

- >Rhodes (?The Making of the Atomic Bomb?), Chapters 1-8
- >Participate in Discussion Board on an original scientific paper
- >Analyses of Chapters 1-8 in Rhodes due Monday 1-15

Monday (1-8) Dr. Settle - Introduction and foundations of nuclear science

Wednesday (1-10) Dr. Settle - Foundations of nuclear science continued and Video ?  
Leo Szilard, the Man Behind the Bomb  
Complete first assignment as found in the 'discussion board section' of Blackboard.

Monday (1-15)

- Discussion (bring printed copy of your response to the discussion board to class)
- Submit chapter analyses for Rhodes, Chapter 1 - 8 in MS Word to your L drive folder in L:\CHEM\07Winter\CHEM195.01\returns.



### **Potential for Explosions; Nuclear and Political (1938 -1943)**

Fission, Nazi expansion, Pearl Harbor, U.S. ? British cooperation, mobilizing US science, the Manhattan Project

Assignment:

- >Rhodes, Chapters 9 - 14

Wednesday (1-17) Dr. Williams - the physics of the bomb

Monday(1-22) Fission and the Manhattan Project- Dr. Settle

Wednesday (1-24) - Day One - Video - Analyses of Rhodes Chapters 9-14 due



### **Final Preparations - Problems and Solutions (1943 - 1945)**

Large-scale production of fissile materials, bomb assembly, Pacific theater, political implication of the bomb

Assignment:

- > Discussion board #2 due by 8AM Monday, Jan. 29

- >Rhodes ? Chapters 15 -17

- >Submit topic for final paper for approval by 2-5 using Discussion Board #3.

Monday (1-29) Discussion Board # 2 and more Manhattan Project

Wednesday (1-31) Video - The Day After Trinity  
Chapter analyses Rhodes 15 - 17 due

Monday (2-5) Discussion of topics from Rhodes Chapter 15 - 17. (Science majors must choose a non-scientific or technical topic. Non-science majors must choose a scientific or technical topic. Prepare and turn in one page to support the discussion of your topic. Video - World at War in preparation for Dr. Strong's lecture.



### **Success at Last (1945)**

Decision to use the bomb, Trinity test, Potsdam, Hiroshima and Nagasaki, and the Russians.

Assignment:

> Submit the topic for final paper with brief description of what it will cover along with five references that you might use. Topic should be focused on a particular subject and include some scientific content. Bring a printed copy of class on Wednesday Feb. 7. Also submit a copy to your L drive folder. Dr. Settle will review, negotiate if necessary, and approve.

>Rhodes Chapters 18 - 19

>Outline for paper due on Wednesday, 2-28. Please submit as a Word file in your folder on the L drive.

> Read the Interim Committee minutes and respond to Discussion Board #3 with a maximum of three well thought out paragraphs.

Wednesday (2-7) - Organizations and committees for bomb. Video - The Bomb from the BBC World at War

Monday (2-12) - > Class discussion on the decision to use the bomb. Discussion board #3

Wednesday (2-14) - The decision to use the Bomb - Dr. Strong Analyses of Rhodes chapters 18-19 and epilog due.

Monday (2-26) - Video - Black Rain



### **The World After Hiroshima**

Ethical issues in using the bomb, the Baruch plan, the Atomic Energy Commission and Department of Energy, the Russian bomb program

Assignmnets

>Rhodes - Epilog

>handouts - articles by Compton and Stimson

>links to Dr. Settle's notes on control of the bomb and public opinion

Respond to Discussion Board # 4 in preparation for class discussion on March 7.

### **Work on first draft of paper.**

Wednesday (2-28) Dr. Ikada - Japanese reactions to atomic bombings Monday (3-5) Discussion board #4 - Dr. Settle Control of postwar nuclear weapons and reaction to use of bomb against Japan. Turn in outline of paper

Monday (3-5) Comparison of US and Russian bomb programs and Dr. Settle Control of postwar nuclear weapons and reaction to use of bomb against Japan. Video on the Russian bomb makers.

Visit site <http://www.pbs.org/opb/citizenk/index.html>

Wednesday (3-7) Class discussion on Stimson's Harper's article and postwar reactions to bomb - complete discussion board #4 response by class time



### **The Hydrogen Bomb and a Nuclear Confrontation**

The arms race between the US and Soviet Union that resulted in both countries producing thermonuclear weapons.

#### Assignments

>Work on first draft of paper - Copy due on Monday March 19

>Visit PBS website on the "Race for the Super" at <http://www.pbs.org/wgbh/amex/bomb/> and respond to Discussion Board # 5.

Preview "The Atomic Cafe" website at <http://www.publicshelter.com/main/tac.html>

> View "Thirteen Days" in theTucker Media Center before Friday, March 23 and respond to Discussion Board #6.

Monday (3-12) Video "The Race for the Super"

Wednesday (3-14) Discussion Board #5 and The Cuban Missile Crisis



### **The Bomb and the Arts**

Assignment >

> View "Thirteen Days" in theTucker Media Center before Friday, March 23 and respond to Discussion Board #6. The Belfer Center site at Harvard (<http://www.cubanmissilecrisis.org/>) provides useful reviews of the film by historians.

Monday March 26 - Return copies review of peer's paper to Dr. Settle and peer

Read poems on handout and website

"Plutonium Ode" by Allen Ginsberg <http://plagiarist.com/poetry/?wid=3754>

"Bomb" by Greg Corso  
<http://www.asunderpress.com/obits/gregorycorso.htm>

"Uh-Oh Plutonium" by Anne Waldman (handout)

Work on PowerPoint presentation

Monday (3-19) The Bomb in Art, Music, and Poetry - Dr Settle will present some nuclear art, music and poetry. Return copies of peer review to Dr. Settle and peer. Two copies of first draft of paper due, one for Dr. Settle and one for peer partner.

Wednesday (3-21) - No class

Friday (3-23) Trip to Bunker (leave W&L at noon - return by 5:00 PM) Brief responses to discussion board #6 due.



### **Student Presentations**

Assignment: >Prepare and present a 10-12 minute presentation on interesting aspects of your paper. Be ready to answer questions on your presentation.

>Turn in final draft of your paper by 9 AM, April 6

Monday (3-26) "The Atomic Cafe" the impact of the nuclear confrontation during the Cold War in from 1945 to the early 1960s. Visit site <http://www.publicshelter.com/main/tac.html> for a brief background of the film.

Turn in review of peer's paper.

Monday (4-2) Student Presentations (5)

2:30 - Frasco

2:45 - Wilson

3:00 - Mueller

3:15 - Timmis

3:30 - Doll

3:45 - Koval

Wednesday (4-4)

2:30 - Price

2:45 - Tutor

3:00 - Cheatham

3:15 - Durvasula

Friday (4-6)

2:30 - Holliday

2:45 - Caron

3:00 - Carlin

3:15 - Miller

3:30 - Trout

3:45 - Cleary



Search

in Current Discussion Board

After  
 Before

Oct 26 2007  
Oct 27 2007

Display Order	Forum	Total Posts	Unread Posts	Total Participants			
1	<a href="#">Early Discoveries</a>	17	<u>17</u>	15	Modify	Manage	Remo

Read an original paper on a discovery relating to nuclear science by Roentgen, Becquerel, Rutherford, Soddy, Aston, or the Curies found in the history site at:

<http://webserver.lemoyne.edu/faculty/giunta/papers2.html#radioactivity>

Enter the author(s) and title of the paper. Respond to each of the following questions with a single paragraph (4 paragraphs total).

- 1) What questions did this paper address?
- 2) Sumarize the discovery.
- 3) What questions did this discovery leave unanswered?
- 4) How did this discovery contribute to the discovery of nuclear fission?

2	<a href="#">Alerting governments to the potential of nuclear fission: The Frisch-Peierls Memorandum</a>	17	<u>17</u>	16	Modify	Manage	Remo
<p>Einstein's letter to President Roosevelt, August 1939.</p> <p><a href="http://www.nuclearfiles.org/menu/library/correspondence/einstein-albert/corr_einstein_1939-08-02.htm">http://www.nuclearfiles.org/menu/library/correspondence/einstein-albert/corr_einstein_1939-08-02.htm</a></p> <p>Frisch-Peierls Memorandum, March 1940</p> <p><a href="http://www.stanford.edu/class/history5n/FPmemo.pdf">http://www.stanford.edu/class/history5n/FPmemo.pdf</a></p> <p>After reading these documents answer the questions below on how the scientists in Britain and the United States brought the potential for an atomic bomb to the attention of their governments.</p> <ol style="list-style-type: none"> <li>1&gt; Who wrote the communications and what inspired them?</li> <li>2&gt; Why do you think each was effective in getting the attention of the respective governments? Compare the writing style of these documments.</li> <li>3&gt;What was the result of these communications in each country?</li> <li>4&gt;How did the responses of the US and British governments differ?</li> </ol>							

5>Explain these differences?

You should base your answers on the original documents, Rhodes, and other sources you care to cite.

3

**The Interim Committee**

17

17

16

Modify Manage Remo

Go to the Truman Library Web site that contains documents from meeting of the Interim Committee

[http://www.trumanlibrary.org/whistlestop/study\\_collections/bomb/large/index.php](http://www.trumanlibrary.org/whistlestop/study_collections/bomb/large/index.php).

Examine the documents (log and notes) from May 14, 1945 to June 21, 1945. Briefly answer the first three questions. Write several paragraphs on the final question.

What was the purpose of the "Interim Committee"?

Who appointed its members?

What were their recommendations concerning the use of the atomic bomb against Japan?

What were their recommendations concerning the bomb and our allies, Great Britain and Russia?

Do you think these recommendations were appropriate? Why or why not.

4

**The Decision to Use the Atomic Bomb**

16

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Modify Manage Remo

Read Stimson's article, *The Decision to Use the Atomic Bomb*

<http://www.aasianst.org/EAA/StimsonHarpers.pdf>.

Answer each of the following questions based on your knowledge of the situation. Limit your answers to one thoughtful paragraph for each question.

1. What was the purpose of the article?

2. What, if any, important aspects of the decision to use the bomb were omitted from the article?

3. What aspects of the decision were emphasized? Do you think any were embellished? If so which ones?

4. Can this decision be justified with just war theory (jus ad bellum or jus in bello) or proportional use of force theory? Why or why not?

5. If you had been an advisor to the President in July 1945 what would you have recommended concerning the use of the bomb against Japan? No hedging, you are there and have to make a recommendation.

5

**Decision to Build the Hydrogen Bomb**

16

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Modify Manage Remo

Provide short answers to each of the following regarding the US decision to build the hydrogen bomb? You are encouraged to agree or disagree with the responses of other students.

Was this a good decision?

What could have been some possible outcomes?

What are the responsibilities of scientists?

Should they continually push the boundaries of what is possible or should they consider the potential effects of their research?

Who should develop ethical guidelines for the use of scientific discoveries?

If the public should be part of the discussion, how can citizens play an informed

6

role when science is becoming so complex?

**The Cuban Missile Crisis**

16

16

16

Modify Manage Remo

Please provide a paragraph response to each of the following questions.

What were the events that led to the crisis?

How close did we come to a nuclear exchange?

What prevented this exchange?

What were the lessons learned from the crisis?

OK

[THE NUCLEAR AGE \(NUCLEAR\\_AGE\)](#) > EXTERNAL LINKS[EDIT VIEW](#)

## External Links



### General Topics

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Excellent general information on a variety of subjects on nuclear science and related issues. Also links to other Web sites. Good supplement to the "Atomic Archive" CD.

[Nuclear Pathways](#) Links to information on five websites dealing with nuclear issues.

#### [Chart of the nuclides](#)

Chart containing all isotopes (stable and radioactive) of all the known elements. Contains information on nuclide such as half live, cross section for neutron capture, and decay scheme for radioactive nuclides

#### [Periodic chart of the chemical elements](#)

Clicking on a symbol provides more detailed information about the element.

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### Biographies

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