



Smithsonian Institution Archives

The Manhattan Project Interviews, 1987-1990

by Smithsonian Institution Archives

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Collection Overview

Repository:	Smithsonian Institution Archives, Washington, D.C., <i>osiaref@si.edu</i>
Title:	The Manhattan Project Interviews
Dates:	1987-1990
Quantity:	files (Reference copies).

Administrative Information

Preferred Citation

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Historical Note

The United States government began underwriting investigations of the feasibility of atomic weapons in October 1941. Within a year, promising research at several universities, particularly at the Metallurgical Laboratory of the University of Chicago, showed that it was possible to produce atomic bombs based on the chain-reacting fission of uranium 235 isotope or of plutonium. This led to the reorganization of the Manhattan District, or "Project," of the U.S. Army Corps of Engineers to make these bombs a reality. Brigadier General Leslie R. Groves directed and coordinated the Project from 1942 to 1945, spending 2.3 billion dollars on nuclear reactors and chemical separation plants at Hanford, Washington, and Oak Ridge, Tennessee, and on the weapon research and design laboratory at Los Alamos, New Mexico. The first plutonium bomb was successfully detonated at Alamogordo, New Mexico, on July 16, 1945. The B-29 bomber *Enola Gay* exploded the first uranium bomb, "Little Boy," over Hiroshima, Japan, on August 6, 1945; the B-29 *Bock's Car* exploded the second plutonium bomb, "Fat Man," over Nagasaki, Japan, two days later.

Introduction

The Smithsonian Videohistory Program, funded by the Alfred P. Sloan Foundation from 1986 until 1992, used video in historical research. Additional collections have been added since the grant project ended. Videohistory uses the video camera as a historical research tool to record moving visual information. Video works best in historical research when recording people at work in environments, explaining artifacts, demonstrating process, or in group discussion. The experimental program recorded projects that reflected the Institution's concern with the conduct of contemporary science and technology.

Smithsonian historians participated in the program to document visual aspects of their on-going historical research. Projects covered topics in the physical and biological sciences as well as in technological design and manufacture. To capture site, process, and interaction most effectively, projects were taped in offices, factories, quarries, laboratories, observatories, and museums. Resulting footage was duplicated,

transcribed, and deposited in the Smithsonian Institution Archives for scholarship, education, and exhibition. The collection is open to qualified researchers.

Descriptive Entry

Stanley Goldberg, consulting historian for the Smithsonian's National Museum of American History (NMAH), recorded eighteen video sessions with fifty-five participants involved in the engineering, physics, and culmination of the Manhattan Project. Goldberg examined the research and technologies necessary to realize the uranium and plutonium bombs. He supplemented interviews with visual documentation of the industrial plants that refined and separated the isotopes, and of the machinery that delivered and dropped the bombs. Interviewees explained the other steps of designing, building, testing and detonating an atomic bomb. Discussions with participants also elicited a social history of the Project as recalled by various men and women responsible for different duties in different locales. Between January 1987 and June 1990 the sessions were recorded on-site or in-studio in Hanford, Washington; Boston, Massachusetts; Oak Ridge and Louisville, Tennessee; Alamogordo and Los Alamos, New Mexico; Washington, D.C.; and Suitland, Maryland. The sessions are divided into five collection divisions: Hanford, Oak Ridge, Cambridge, Los Alamos, and Alberta.

This collection consists of eighteen interview sessions, separated into five collection divisions, totaling approximately 47:00 hours of recordings, and 1188 pages of transcript. There are three generations of tape for each session: originals, dubbing masters, and reference copies. In total, this collection is comprised of 85 original videotapes (10 U-Matic videotapes, 24 1-inch reels, and 51 Beta videotapes), 54 dubbing master videotapes (54 U-Matic videotapes), and 29 reference copy videotapes (29 VHS videotapes). The collection has been remastered digitally, with motion jpeg 2000 and mpeg digital files for preservation, and Windows Media Video and Real Media Video digital files for reference.

Please note that sessions 14 and 15 in Collection Division Four are comprised of dual sets of tape from two cameras positioned at different angles.

Names and Subject Terms

This collection is indexed in the online catalog of the Smithsonian Institution under the following terms:

Subjects:

- Atomic bomb
- History of science and technology
- Military history
- Physics
- Women -- History
- World War, 1939-1945

Types of Materials:

- Interviews
- Oral history
- Videotapes

Names:

Agnew, Harold M.
Agnew, Harold M. interviewee.
Albaugh, Frederic W.
Albaugh, Frederic W. interviewee.
Ashworth, Frederick L.
Ashworth, Frederick L. interviewee.
Babcock, Dale F.
Babcock, Dale F. interviewee.
Bacher, Robert.
Bacher, Robert. interviewee.
Bainbridge, Kenneth T.
Bainbridge, Kenneth T. interviewee.
Banic, George M., Jr.
Banic, George M., Jr. interviewee.
Bethe, Hans.
Bethe, Hans. interviewee.
Black, Colleen.
Black, Colleen. interviewee.
Bolling, Connie.
Bolling, Connie. interviewee.
Borst, Lyle F.
Borst, Lyle F. interviewee.
Bradbury, Norris R.
Bradbury, Norris R. interviewee.
Cease, Wilson A.
Cease, Wilson A. interviewee.
Chapman, Vivian Russell.
Chapman, Vivian Russell. interviewee.
Christy, Robert.
Christy, Robert. interviewee.
Clinton Engineering Works (Oak Ridge, Tenn.)
Creutz, Edward C.
Creutz, Edward C. interviewee.
Denton, Lawrence.
Denton, Lawrence. interviewee.
Enola Gay (Bomber)
Fat Man (Bomb)
Feld, Bernard T.
Feld, Bernard T. interviewee.
Foster, Richard F.
Foster, Richard F. interviewee.
French, Anthony.
French, Anthony. interviewee.
Frisch, David.
Frisch, David. interviewee.
Frisch, Rose.
Frisch, Rose. interviewee.
Goldberg, Stanley interviewer.
Googin, John M.
Googin, John M. interviewee.
Greager, Oswald H.
Greager, Oswald H. interviewee.

Hanford Engineering Works (Wash.)
Hawkins, David.
Hawkins, David. interviewee.
Hornig, Donald.
Hornig, Donald. interviewee.
Hornig, Lillian.
Hornig, Lillian. interviewee.
Huber, Paul.
Huber, Paul. interviewee.
Keim, Chris P.
Keim, Chris P. interviewee.
Larson, Clarence E.
Larson, Clarence E. interviewee.
Larson, Jane W.
Larson, Jane W. interviewee.
Little Boy (Bomb)
Livingston, Audrey B.
Livingston, Audrey B. interviewee.
Livingston, Robert S.
Livingston, Robert S. interviewee.
Los Alamos Scientific Laboratory (N.M.)
Manhattan Project (U.S.)
Mark, J. Carson.
Mark, J. Carson. interviewee.
Matthias, Franklin T.
Matthias, Franklin T. interviewee.
McCue, William P.
McCue, William P. interviewee.
Morrison, Philip.
Morrison, Philip. interviewee.
National Air and Space Museum (U.S.).
National Air and Space Museum (U.S.). Paul E. Garber Preservation, Restoration, and Storage Facility.
Parsons, James A.
Parsons, James A. interviewee.
Perkins, Leonard F., Sr.
Perkins, Leonard F., Sr. interviewee.
Project Alberta
Ramsey, Norman F., Jr.
Ramsey, Norman F., Jr. interviewee.
Reines, Frederick.
Reines, Frederick. interviewee.
Serber, Robert.
Serber, Robert. interviewee.
Smith, Alice Kimball.
Smith, Alice Kimball. interviewee.
Smith, Cyril.
Smith, Cyril. interviewee.
Sweeney, Charles W.
Sweeney, Charles W. interviewee.
Tinian Island Airbase
Trinity Test Site (N.M.)
Vanstrum, Paul R.
Vanstrum, Paul R. interviewee.

Wahlen, Ralph K.
Wahlen, Ralph K. interviewee.
Weinberg, Alvin M.
Weinberg, Alvin M. interviewee.
Wigner, Eugene P.
Wigner, Eugene P. interviewee.
Wilson, Jane S.
Wilson, Jane S. interviewee.
Wilson, Robert
Wilson, Robert interviewee.
Wright, Wakefield A.
Wright, Wakefield A. interviewee.

Container Listing

Series 1: Hanford

Interviewees in this collection division contributed in various roles to the refinement of plutonium 239 isotope at the Hanford Engineer Works in the state of Washington. In January of 1943, General Groves chose the site for construction of three full-scale plutonium piles for the mass production of plutonium 239--an isotope for the chain reaction in an atomic bomb--as well as water-treatment plants for cooling the reactors. The E.I. Du Pont de Nemours Company also built four remote-controlled "canyons" for the chemical separation of plutonium from uranium 238. Sessions were shot at the Columbia Cable Television studio and on-site at the Hanford Reservation.

Participants for Session One assisted in operations at the "B" site nuclear reactor as operators or support personnel. Lawrence Denton began work at the Hanford construction camp in September 1942 as a receiving and shipping clerk. Wilson A. Cease came to Hanford as a Du Pont employee in March 1944, and worked as a security patrolman in the area where uranium slugs were canned and sealed. Jess R. Brinkerhoff and Ralph K. Wahlen were both employed by the Remington Arms plant in Salt Lake City, Utah, and transferred to Hanford. Brinkerhoff arrived in November 1943, and worked in the fire department before becoming a power operator in a water treatment plant. Wahlen was employed in the fuel piece canning area. R.M. Buslach arrived in Hanford after the war and worked in plant maintenance for the General Electric Company.

Session Two participants worked for the Du Pont Company as chemical engineers at Hanford. Wakefield A. Wright and Vivian Russell Chapman were first transferred from Alabama Ordnance Works by Du Pont to the Manhattan Project facilities at Oak Ridge, Tennessee, for training before arriving in Hanford in 1944. William P. McCue was employed at the Oklahoma Ordnance Works before training at the Argonne National Laboratory in Chicago, Illinois, and relocating to Hanford. The responsibilities of these three men at Hanford included training the crews and supervising the operators in the nuclear reactors and chemical separation plants.

Session Three brought together a group of Hanford administrators. Oswald H. Greager had been a chemist for Du Pont after receiving his Ph.D. in that field from the University of Michigan in 1929. He came to Hanford in October 1944, from the Separations Development Division at the Clinton Engineer Works in Oak Ridge, Tennessee. Greager, on military duty at Hanford, served as Technical Officer and supervised the work of the contractor in the chemical separation area. Richard F. Foster joined the project in September 1943, on a contract with the Office of Scientific Research and Development at the University of Washington College of Fisheries. He studied the effects of radiation on the Columbia River and eventually became concerned with evaluating radiological doses received by people from all environs at Hanford. Leonard F. Perkins, Sr., came to Hanford in the spring of 1944 as an employee of the United States General Accounting Office to audit the contract of the Du Pont Company. In 1946, he transferred to the Atomic Energy Commission and returned to Hanford in 1951 to direct government-contracted construction there until 1973. During World War II Frederic W. Albaugh worked in the Metallurgical Laboratory at the University of Chicago as a group leader in the plutonium chemistry section. He arrived in Hanford to head its plutonium chemistry section in 1947 and continued to work there in various administrative capacities until 1971. Colonel Franklin T. Matthias, who had worked under General Groves in construction contracting for the Pentagon, was largely responsible for the site selection of Hanford. Groves appointed Matthias in February of 1943 to be commanding officer of the Hanford facilities.

The discussions detailed the nature of the workload at Hanford, the living conditions, and the administration of the Project. The sessions were shot on three-quarter-inch U-matic tape and provided visual documentation of the "B" site nuclear reactor, tools used for the charge/discharge process, and period photographs of the interiors of the chemical separation "canyons."

Box 1

Transcripts of Interviews

Session 1: 13 January 1987

Session 2: 13 January 1987

Session 3: 14 January 1987

Video Recordings of Interviews

Session 1: 13 January 1987

Session 2: 13 January 1987

Session 3: 14 January 1987

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Series 2: Oak Ridge

Interviewees in this collection contributed in various roles to the refinement of uranium 235 isotope at the Clinton Engineer Works in Oak Ridge, Tennessee. Built concurrently with the Hanford Reservation, the Clinton complex was designed for continued research and the refinement of the fissionable isotope uranium 235 from uranium 238. The sessions were shot at a studio of Kennedy Maxwell Productions, and on-site at the Y-12 Electromagnetic Separation Plant and the K-25 Gaseous Diffusion Plant.

Participants for Session Four were instrumental in designing and running the nuclear reactors at Oak Ridge and Hanford. Dale F. Babcock received his Ph.D. in physical chemistry at the age of twenty-three from the University of Illinois in 1929. Du Pont employed his services as a research chemist until 1942, when he became a technical specialist on the explosive potential of plutonium. Before the war, Lyle F. Borst stayed at the University of Chicago as a Research Associate after his doctoral studies in physics. In 1943 he was appointed chief physicist of the Clinton Laboratories near Oak Ridge, where he remained until 1946. Edward C. Creutz received his Ph.D. from the University of Wisconsin in 1939, taught physics at Princeton University, and joined the Manhattan Project as a group leader between 1942 and 1946. After he received his M.A. from Columbia University in 1939 Albert Wattenberg was a spectroscopist for Schenley Products, Incorporated. He spent a year with the Office of Scientific Research and Development at Columbia University before moving to the Metallurgical Laboratory in Chicago as a group leader under Enrico Fermi in January 1942.

Alvin M. Weinberg, born in 1915, earned his three degrees in physics at University of Chicago by 1939. He stayed there during the war at the Metallurgical Laboratory and moved to Oak Ridge in 1945. Eugene P. Wigner was born in Hungary in 1902. He earned his doctorate in physics at the Technical University of Berlin in 1925 and came to the United States at the behest of Princeton five years later. Together with Leo Szilard he played a key role in sparking President Franklin D. Roosevelt's interest in atomic power, and during the war he designed the Hanford reactors. Wigner won the Nobel Prize for physics in 1963.

The four participants of Session Five helped operate the isotope separation machinery designed by the physicists and engineers. Colleen Black was nineteen years old when she arrived in July 1944 and was assigned to find pipe leaks at the K-25 Plant. The other three worked in the Y-12 Plant. Connie Bolling was teaching at Coburn High School, Virginia, in 1943 when he gave six weeks' notice to join a government project that, in his understanding, was to end the war. He trained cubicle and vacuum pump operators and remained after 1945 in the effort to maximize calutron output. Jane W. Larson arrived in September 1943 as a historian, before switching to technical editor, reporting on the effort to maintain vacuum consistency. She also worked part-time for the Oak Ridge Journal. Audrey B. Livingston, born in 1926, started in 1944 as a cubicle operator.

Participants for Session Six helped design, build and operate the calutrons in the Y-12 Plant. George M. Banic, Jr., worked on high voltage power supplies for the General Electric Company in Schenectady, New York, and came to Oak Ridge in March 1944, to help with the stable isotope program. He stayed after the war to continue isolating isotopes at the pilot plant until it closed in 1975. Clarence E. Larson and Robert S. Livingston received their Ph.D.s from the University of California at Berkeley and continued their research at the Radiation Laboratory there until 1943. Larson took charge of the technical staff at the Y-12 plant at Oak Ridge through 1950 when he became director of the Oak Ridge National Laboratories. Livingston oversaw Stone and Webster Engineering Corporation's design of the Y-12 Plant and continued working at Oak Ridge until his retirement in 1981. John M. Googin sought out a position in nuclear chemistry while finishing his B.S. at Bates College in Maine. He started work at Oak Ridge as a process chemist in the summer of 1944, assisting in the recycling of uranium waste. Chris P. Keim received his Ph.D. in chemistry from the University of Nebraska in 1940. In 1944 he left his fellowship at the Mellon Institute to become a research physicist for the stable isotope program at the pilot plant. Keim continued working at Oak Ridge until his retirement in 1971.

Session Seven participants helped design and operate the K-25 Plant for the gaseous diffusion of uranium 235. Paul R. Vanstrum and James A. Parsons majored in chemical engineering at Columbia University

where they participated in the manufacture of part of the diffusion barrier. Vanstrum began working for Union Carbide Corporation, the K-25 operating contractor, after graduation and transferred to Oak Ridge in August 1944. He stayed at the K-25 Plant until it closed in 1964. Parsons continued to work on the manufacture of diffusion barriers in New York until September 1944, when he went to Oak Ridge as a foreman. Paul Huber also had a degree in chemical engineering and began work at Oak Ridge in 1944.

Goldberg focused discussions on the theory and practice of reactor construction; nature of the workload; living conditions; and security measures at Oak Ridge. The sessions were shot on one-inch tape and provided visual documentation of the Y-12 and K-25 plants, and calutron components, as well as period photographs of Oak Ridge.

Box 2

Transcripts of Interviews

Session 4: 3 March 1987

Session 5: 3 March 1987

Session 6: 4 March 1987

Session 7: 5 March 1987

Session 8: 6 March 1987

Video Recordings of Interviews

Session 4: 3 March 1987

Session 5: 3 March 1987

Session 6: 4 March 1987

Session 7: 5 March 1987

Session 8: 6 March 1987

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Series 3: Cambridge

Interviewees in this collection worked on the physics of atomic bomb design at the Los Alamos Scientific Laboratory in New Mexico. The sessions were taped at the studios of Audvid Film and Tape Production, in Boston, Massachusetts.

Four physicists who played important roles in the "Trinity" atomic bomb test at Alamogordo, New Mexico, were reunited for Session Nine. Kenneth Bainbridge, a physicist at Harvard University, designed and built the Harvard cyclotron which was used at Los Alamos. In 1940 he joined the radar research at the Massachusetts Institute of Technology (MIT), and soon after went to Cambridge University in England to work on radar and uranium experiments. He was recruited for the Manhattan Project and moved to Los Alamos in the summer of 1943. In March 1944, he took charge of the Trinity test and administered it from site selection to detonation. Donald Hornig, also a physicist at Harvard before he joined the Los Alamos staff, designed the high-voltage capacitors that fired the Fat Man's multiple detonators. Philip Morrison received his Ph.D. in theoretical physics from the University of California at Berkeley in 1940, and worked on the Project at the Metallurgical Laboratory of the University of Chicago before arriving at Los Alamos in 1944 to serve as Physicist and Group Leader. Robert Wilson had recently completed his Ph.D. at the University of California at Berkeley and taught at Princeton University before he arrived in Los Alamos in April 1943. He headed various subgroups engaged in cyclotron research for the Trinity test.

Session Ten participants worked at Los Alamos with different levels of responsibility. Robert Wilson and Robert Serber were Division Leaders. Serber received his Ph.D. from the University of Wisconsin in 1934, and worked with J. Robert Oppenheimer as a Research Associate at the University of Chicago's "Met Lab" before arriving at Los Alamos. Serber's introductory lectures on the physics and chemistry of the Project in April 1943 became the Los Alamos Primer.

Anthony French received his A.B. in physics from Cambridge University. Before coming to Los Alamos in 1944, he worked at Cambridge's Cavendish Laboratory. David Frisch was still a graduate student when he arrived at Los Alamos as a Junior Physicist in 1943. He received his Ph.D. from MIT in 1947.

Four women from Los Alamos convened to discuss their professional and domestic lives in Session Eleven. Lillian Hornig received her M.A. in chemistry from Harvard in 1943 and her Ph.D. in 1950. From 1944 to 1946 she served as Staff Scientist in the plutonium chemistry division at Los Alamos, and as Section Leader for high explosives development. Rose Frisch received her Ph.D. in physiological genetics from the University of Wisconsin in 1943. At Los Alamos, she monitored the effects of radiation in the medical laboratory. Alice Kimball Smith received her Ph.D. in history from Yale University and taught social studies at Los Alamos High School. After the war she served as historian for the Association of Los Alamos Scientists. Her book, *A Peril and a Hope: The Scientists' Movement in America 1945-1947*, was published in 1965. Jane S. Wilson also taught at the Los Alamos High School.

Physicists who worked on the implosion program gathered for Session Twelve. Bernard T. Feld worked at the Met Lab at the University of Chicago before coming to Los Alamos in 1944. He received his Ph.D. in physics from Columbia University in 1945. Cyril Smith received his D.Sc. in metallurgy from MIT in 1926. He served as associate division leader in metallurgy at Los Alamos from 1943 to 1946. Robert Serber and Philip Morrison appeared again in this interview.

Goldberg encouraged discussion of the culture and the workload at Los Alamos, and the attitudes towards that work and its consequences.

Box 3

Transcripts of Interviews

Session 9: 1 December 1987

Session 10: 1 December 1987

Session 11: 2 December 1987

Session 12: 2 December 1987

Video Recordings of Interviews

Session 9: 1 December 1987

Session 10: 1 December 1987

Session 11: 2 December 1987

Session 12: 2 December 1987

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Series 4: Los Alamos

Interviewees in this collection also contributed to the atomic bomb design and testing program in New Mexico. J. Robert Oppenheimer, the physicist from the University of California at Berkeley charged with supervising this part of the Manhattan Project, picked the Los Alamos location because of its isolation and its beauty. The sessions were shot at the Trinity test site and in a Los Alamos conference room.

The participants in Session Thirteen worked on the Trinity test at different levels of responsibility. Kenneth T. Bainbridge administered the test from site selection to the write-up of the official report. He came to Los Alamos in the summer of 1943, having previously worked on radar at Massachusetts Institute of Technology and in England; he had also designed and built Harvard University's first cyclotron. Robert Wilson was not yet thirty when he arrived at Los Alamos in April 1943, where he headed various subgroups using cyclotron research. Wilson had come directly from a Ph.D. at Berkeley and a teaching and cyclotron research post at Princeton. During the Trinity test he helped install the bomb and measured implosion and fission behavior during the explosion.

Session Fourteen participants worked at various levels on the theoretical underpinnings of an atomic weapon. Hans Bethe, head of the Theoretical Division at Los Alamos, left Germany in 1933 for Cornell University before applying his research to the war effort in 1940. He gave up his work on explosives and radar in July 1942 when he became convinced of the feasibility of an atomic bomb. Bethe returned to Cornell after the war and won the Nobel Prize in Physics in 1967. Frederick Reines made his reputation as a doctoral student at New York University when he developed a new equation in applied mathematics. Reines joined the Theoretical staff in late 1943 and remained at Los Alamos as a Group Leader until 1959. Canadian J. Carson Mark came to Los Alamos via research at the Metallurgical Laboratory in Chicago and a doctorate under Oppenheimer at Berkeley. Fellow Canadian Robert Christy arrived by way of George Placzek's Montreal study group and summer seminars in applied mathematics at Brown University in 1941 and 1942.

In addition to Bainbridge, Session Fifteen included experimentalists Robert Bacher and Norris E. Bradbury, and administrator David Hawkins. Bacher led fission studies at Cornell and worked at MIT's Radiation Laboratory before heading the Experimental and Gadget Divisions at Los Alamos. His opposition to militarized working conditions manifested itself further in his post-war efforts for civilian control of nuclear research. Bradbury put his Berkeley Ph.D. to work at the U.S. Navy's Dahlgren Proving Ground for four years before his assignment to the Ordnance Division at Los Alamos. He replaced Oppenheimer as director of the Los Alamos Laboratory in September 1945. Hawkins grew up in New Mexico and went to Berkeley to earn his Ph.D. in philosophy. He returned as administrative assistant to Oppenheimer in the summer of 1943, becoming the primary liaison between the scientists and the military administration of the Project.

Goldberg elicited comparisons of the work experience from the theoretical and experimental physicists as well as discussions of social life at Los Alamos. The series was shot on half-inch Betacam tape and provides visual documentation of the Trinity test site, Los Alamos in 1989, and period photographs of Los Alamos and preparations for the Trinity test.

Box 4

Transcripts of Interviews

Session 13: 15 August 1989

Session 14: 18 August 1989

Session 15: 18 August 1989

Session 16: 19 August 1988

Video Recordings of Interviews

Session 13: 15 August 1989

Session 14: 18 August 1989

Session 15: 18 August 1989

Session 16: 19 August 1988

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Series 5: Alberta

Four participants from "Project Alberta" convened for Sessions Seventeen and Eighteen. This phase of the Manhattan Project dealt with the conversion of the Trinity test device into the practical weapons systems that were used twice on Japan. The interviewees were among those who designed the bombs to fit the B-29, wired them with redundant electronics, rehearsed the mission, established a base on Tinian Island, and released the bombs over Hiroshima and Nagasaki. The sessions were shot at the National Museum of American History in Washington, D.C., and at the National Air and Space Museum's Paul E. Garber Facility in Suitland, Maryland.

Norman F. Ramsey, Jr., received his Ph.D. in physics from Columbia University in 1940. During World War II, Ramsey consulted with various government groups concerned with military technology. In 1943 he moved from the offices of the Secretary of War to Los Alamos, where he became a group leader for bomb delivery. After the war, he returned to Columbia and won the Nobel Prize for Physics in 1959. Harold M. Agnew received his A.B. in chemistry from the University of Denver in 1942. His advisor referred him to Enrico Fermi, under whom his responsibility was for some of the measurements of the atomic explosions over Japan. After the war Agnew earned his Ph.D. in particle physics at the University of Chicago before returning to Los Alamos Scientific Laboratory. He directed the Laboratory there from 1970 to 1979.

Frederick L. Ashworth graduated from the United States Naval Academy and completed the Naval Postgraduate School course in ordnance engineering shortly before the Japanese attack on Pearl Harbor in 1941. After service in the Pacific Theater of Operations, he worked for William S. Parsons and Norman F. Ramsey on the detonation components of the atomic bombs. Ashworth acted as weaponeer on the Nagasaki mission and as General Groves' representative on Tinian Island. His book, *The Atomic Bombings of Hiroshima and Nagasaki*, was published in 1947. Charles W. Sweeney was born in 1920 and grew up in eastern Massachusetts. He enlisted as an air cadet in April 1941, and rose to commander of a bomber squadron in the European Theater of Operations. With nearly three thousand hours of accident-free flight time to recommend him, Sweeney joined Colonel Paul Tibbetts' 509th Composite Group of B-29's in September 1944. He piloted an observation plane at the Hiroshima bombing and dropped the "Fat Man" over Nagasaki from Bock's Car. After he completed his enlistment, he returned to Massachusetts to begin a wholesale leather business and served in the Air National Guard until 1976.

Goldberg used the *Enola Gay* site to draw from the participants details of their involvement with the technologies of Project Alberta. Other questions stimulated recollections of experiences on Tinian Island and on the two missions to Japan. The sessions were shot with half-inch Betacam tape and provide visual documentation of the Little Boy and Fat Man bomb models and the B-29 *Enola Gay*.

Box 5

Transcripts of Interviews

Session 17: 5 June 1990

Session 18: 6 June 1990

Video Recordings of Interviews

Session 17: 5 June 1990

Session 18: 6 June 1990

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