Life at Trinity Base Camp

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Prepared by Human Systems Research, Inc.
Prepared for White Sands Missile Range, New Mexico

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by
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Cover photograph: Aerial photograph of Trinity Base Camp, July 1945.
Courtesy National Archives, College Park, Maryland

PREFACE

Numerous books and articles have been published about the Manhattan Project, Los Alamos, and the Trinity Test, the detonation of the first atomic bomb. Secrecy and security were essential to the project, indicated by the isolated location of the Los Alamos laboratory for the manufacture and assembly of the weapon. For the Trinity Test site, a very remote and isolated location in central New Mexico was selected.

The soldiers assigned to the Trinity Test site did not know their final destination when they received their travel orders to New Mexico. With a few rare exceptions, the soldiers and other personnel who set up the experiment did not know the purpose of their work until the actual explosion took place. To maintain this high level of secrecy, a base camp, the headquarters of the McDonald Brothers Ranch, was established a few miles southwest of Ground Zero. While the soldiers and scientists developed the necessary infrastructure for the test, Trinity Base Camp was their home.

Because of the high level of security, the soldiers never left Base Camp during the seven months prior to the Trinity event. Baseball, poker, and playing polo on horses from the military police detachment helped alleviate the boredom. However, as the date for the test became closer, the work days became longer and more intense.

Life at Trinity Base Camp provides a vivid description of everyday life at this camp through photographs and interviews with individuals like the camp clerk, a military policeman, and the young private responsible for the garbage detail. Unlike the abundant scientific reports available for *Trinity Experiments*, the written record is nonexistent for learning about the day-to-day activities at Trinity Base Camp.

Mr. Tom Merlan relied heavily on interviews with several individuals, often using the words of these men to describe the details about the camp and daily life. Historic photographs of Trinity Base Camp, the soldiers, and other participants contribute to the description of camp life. In addition, the archaeological and architectural remains of Trinity Base Camp were documented and verified during the interviews and site visits.

Life at Trinity Base Camp is written for the general audience. The reader learns about the contributions and sacrifices these individuals made while preparing the Trinity Test. Their efforts resulted in the successful explosion of the world's first atomic bomb. This event contributed to the end of World War II, the beginning of the Cold War, and introduced a technology that would change the world forever.

David T. Kirkpatrick, Ph.D.
Principal Investigator

FOREWORD

For the last 14 years as an archaeologist for White Sands Missile Range, one of the continuing high points has been exploring the resources of Trinity National Historic Landmark. Beginning with surveys to determine the remains of the first atomic explosion and continuing with stabilization efforts of the Trinity structures, this subject has been one of fascinating revelations.

The incredible history of Trinity Base Camp (Site LA 82956) has been duplicated by the people on the ground actually performing the research and restoration. Pat Taylor led a crew who first made adobes and then rebuilt the fallen walls of the old ranch house at the Base Camp, and then reroofed the building. His attitude of "doing it right" set the pattern for future work. Morgan Reider helped in the design of the work and mapped many of the remaining features of the Landmark, and Mary Slater and Skip Connelley worked on the old frame house and the historic corrals. William Russell and Jeanie Hart provided a detailed description of the archaeological features at the site.

Central to all the projects over the years was the guiding hand of Dave Kirkpatrick, who is the Principal Investigator for Trinity. Dave has become one of the world's experts on the archaeology of the atomic bomb, with first-hand knowledge of the dozens of experiments, structures, roads, communications lines, and other places of interest that relate to the test. He has always been ready with several options when problems arose, and has always been conscience of the importance of his actions. After Roving Sands soldiers used the Base Camp as the center for a war game, Mary Slater, Skip Connelley, and Dave came up with the idea of covering the openings and painting them to represent windows and doors. This simple expedient makes it plain to everyone that this is a special place that is being protected and, since then, we have had no trouble.

Tom Merlan has proved equal to the task of synthesizing information from numerous sources for two wonderful books, *The Trinity Experiments*, describing the scientific effort to record the explosion, and this one, dealing with the non-scientists, the people who made the history happen. Tom's remarkable scholarship on these projects has been a pleasant surprise, since he continually balances information from different sources and has an acute awareness of the source for each piece of information. He is one of the most outstanding researchers that I have ever met.

This volume helps tell the story of Trinity by balancing archaeological, historical, and oral history information. It tells a human story of a moment in time that changed New Mexico and the world, and set the stage for the dominant phase of the twentieth century, the Cold War. Without the atomic bomb, the high-stakes conflict with the Soviet Union would have been much less intense. Trinity can be considered the beginning of the Cold War, as well as one of the final events of World War II.

ROBERT BURTON
WHITE SANDS MISSILE RANGE ARCHAEOLOGIST

CONTENTS

CONTENTS (cont.)

FIGURES

FIGURES (cont.)

ACKNOWLEDGMENTS

Thomas Merlan (author), David T. Kirkpatrick (Human Systems Research, Inc.), Billy Russell (Human Systems Research, Inc.), and Robert Burton (White Sands Missile Range archaeologist) interviewed Felix DePaula on 4 November 1998, at Trinity Base Camp. The author would like to acknowledge the assistance of Robert Burton, who arranged the field visit and participated in that interview; Billy Russell, who also assisted in the interview, and in locating structures and features at the base camp; and David T. Kirkpatrick, who supervised the field visit and the preparation of this report. Merlan, Kirkpatrick, and Burton also interviewed David Rudolph on 6 October 2000, at Trinity Base Camp. The author gratefully acknowledges the assistance and cooperation of Benjamin C. Benjamin, Marvin R. Davis, Roy C. DeHart, Felix DePaula, Wilburn T. Dunlap, Alva R. Harris, Robert J. Gibson, Robert D. Krohn, David P. Rudolph, and Harold H. Smith, who kindly shared their detailed knowledge of Trinity Base Camp and the events, both the mundane and the world-shaking, that happened there.

The author further wishes to acknowledge the kind assistance of Mrs. Richard O'Meara of West Hartford, Connecticut, who permitted us to copy personal photographs for this report.

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The author thanks Ozzie Bagg for his photography of the ring, Figure 3, and several personnel photographs. Also, thanks to Jo Ruprecht for composing the Figure 5 panorama.

The conclusions and opinions in this report are those of the author and are not the findings or conclusions of White Sands Missile Range. The author takes sole responsibility for any errors.

Captain Howard C. Bush, commander of the military police detachment at Trinity, had rings made for men of the detachment. This ring belonged to Sergeant Richard O'Meara. Gift of Mrs. Richard O'Meara to White Sands Missile Range. Photography by Ozzie Bagg. *Courtesy U.S. Army, White Sands Missile Range Public Affairs Office.*

INTRODUCTION

On Monday, July 16, 1945 at 5:29:45 A.M. Mountain War Time, scientists working in cooperation with the U.S. Army staged the world's first atomic explosion in a remote region of south-central New Mexico. To prepare for the event, the military built numerous instrumentation shelters, personnel bunkers, and a complex communications network. In addition, George McDonald and McDonald Brothers ranch headquarters were used to assemble the bomb and to house personnel. Today the area is part of the Trinity National Historic Landmark.

White Sands Missile Range has a continuing program to manage and interpret the cultural resources associated with the Trinity National Historic Landmark. One aspect of this program involves the combination of oral history and archaeological studies to document the remains of the Trinity event. A recent study involved interviewing several scientists about their experiments and documenting the archaeological remains of those experiments (Merlan 1997). In the course of that study, it became apparent that another study needed to be done focusing on Trinity Base Camp and the military police, engineers, soldiers, and civilians who lived and worked at Trinity Base Camp (Site LA 82956).

This report is the result of a request by White Sands Missile Range to obtain detailed information about Trinity Base Camp, where in 1944 and 1945, scientists, military personnel, and civilians made the extensive preparations for the world's first atomic explosion. In 1997 and 1998, the author made a search for surviving military personnel and civilian workers who lived and worked in Trinity Base Camp. Personnel lists kindly furnished by Mr. Marvin R. Davis of Bartonville, Illinois, word of mouth and extensive telephone inquiries across the United Sates located 10 veterans of the camp. We hope that others in the future may contact White Sands Missile Range and Human Systems Research.

The 10 veterans were interviewed initially by telephone. In several cases, personal visits and trips to Trinity Base Camp took place afterwards. The veterans are Benjamin C. Benjamin, Marvin R. Davis, Roy C. DeHart, Felix DePaula, Wilburn T. Dunlap, Alva R. Harris, Robert J. Gibson, Robert D. Krohn, David P. Rudolph, and Harold H. Smith. Dunlap was a civilian engineer and Krohn a civilian scientist. Both worked and lived in and around Trinity Base Camp. All the others were servicemen stationed at Trinity Base Camp during the preparation for the world's first atomic weapon test. More detailed biographical sketches are presented in Appendix A.

Benjamin C. Benjamin attended the University of Minnesota for one year, studying engineering and participating in the Reserve Officers' Training Program. He then went to work making prisms for fire-control systems at Minneapolis Honeywell until he joined the U. S. Army after Pearl Harbor. After several assignments, he was sent to Carnegie Tech in Pittsburgh to study engineering, and after graduation,

assigned to Los Alamos in 1944. He was 22 years old when he was sent to Trinity as part of the photography team in the Spring of 1945.

Marvin R. Davis, inducted into the U.S. Army in December 1942, was assigned as a military policeman in the 4817th Unit of the 8th Service Detachment of the Army Corps of Engineers. After a brief training period, he was sent to Los Alamos in January 1943 to serve as a sentry and to conduct patrols. In December 1944 he was assigned to Trinity Base Camp. Davis was 22 years old at the time.

Roy C. DeHart was inducted into the U.S. Army in December 1942. After receiving MP basic and calvary training, he was assigned to the 4817th Unit of the 8th Service Detachment at Los Alamos in February 1943. In early 1946, DeHart (25 years old) was assigned to Trinity Base Camp as the replacement for the stable sergeant, serving for about 7 months.

Felix DePaula, a native of Brooklyn, New York, was drafted in October 1944, and eventually assigned to the 4817th Unit of the 8th Service Detachment. After a brief tour of duty at Los Alamos, he was sent to Trinity Base Camp in January 1945. At 18 years of age, he was probably the youngest soldier in camp. DePaula volunteered to pick up trash around the camp and deliver it to the dump.

William T. Dunlap served as a civilian surveyor for the U.S. Army. He attended New Mexico Military Institute and the University of New Mexico. In 1941, one of his first assignments was to lay out what became Walker Air Force Base, near Roswell, New Mexico. In late November 1944, Dunlap was ordered to Alamogordo, New Mexico for "duty connected with flood control work." He was 30 years old when he surveyed the Trinity project footprint.

Alva R. Harris joined the U.S. Army in January 1943. He was a member of the first MP detachment of 4817th Unit of the 8th Service Detachment at Los Alamos. In late December 1943, the 20 year old Harris was sent to Trinity. He performed a variety of guard and patrol duties until mid-September 1945.

Robert J. Gibson was inducted in September 1942 and sent to the University of Minnesota for the Army Specialized Training Program. Because of his academic excellence, he had the opportunity to attend the Massachusetts Institute of Technology; he chose a special assignment instead. He conducted statistical analyses at Oak Ridge for the Manhattan Project. After a brief stay at Los Alamos, he began his assignment as the assistant post engineer at Trinity in February 1945. Age 29, he had only one brief leave during the year-long assignment at Trinity.

Robert D. Krohn was a civilian scientist who as a student had a working knowledge of the Van de Graaf generators associated with nuclear studies. When the equipment was sent to Los Alamos, he and a colleague, James Hush, were responsible

for the reassembly in April 1943. Krohn was 26 years old when he went to Trinity in March 1945 to set up instrumentation for the 100-ton test and the Trinity test.

David P. Rudolph, as a civilian, worked at the University of Chicago's Metallurgical Laboratory (cover name for the Manhattan Project) where he was in charge of the rare minerals, including uranium oxide, needed for the atomic bomb. Because of the project's secrecy level, the Laboratory would not tell Rudolph's draft board of his job. He was subsequently drafted in August 1943. However, the Laboratory was able to have him assigned back to the lab to continue his inventory duties. He went to Los Alamos in January 1945. Rudolph was 24 years old when he went to Trinity Base Camp as the clerk of the Engineer Detail of the 4817th Unit of the 8th Service Detachment, U.S. Army Corps of Engineers. He served from February to September 1945 at Trinity Base Camp.

Harold H. Smith was inducted into the U.S. Army in September 1942. He received MP training as well as tank training before being sent to Los Alamos in April 1944. In early 1945, he was sent to Trinity as a member of the Engineer Detail, not as an MP. At age 24, Smith was a Tech Sergeant and tank commander. He drove a lead-lined tank into Ground Zero just after the blast for the collection of soil samples.

Each of these ten individuals was interviewed separately. Their recollections sometimes agree and sometimes conflict. Where necessary, this report points out discrepancies.

Unless otherwise indicated, the following information was obtained in interviews with Benjamin C. Benjamin on 29 June 1999; with Marvin R. Davis on 13, 17, and 21 November and 4 December 1998; with Roy C. DeHart on 2 July 1999; with Felix DePaula on 4 November and 3 December 1998; with Wilburn T. Dunlap on 21 June and 26 July 1999; with Robert J. Gibson on 21 June 1999; with Robert D. Krohn on 29 June 1999; with Alva R. Harris on 5 June 1999; with Harold H. Smith on 5 June 1999; and with David P. Rudolph on 2 December 1998 and 4 December 1999.

This report also cites published and unpublished sources (see "References Cited"), and includes photographs and maps obtained from the informants, from other private sources, and from the National Archives and Records Administration (NARA).

The west half of Figure 5, referred to throughout this report as "the panorama," appeared in Human Systems Research Report No. 9605 (Slater 1996:5). It is reproduced here by courtesy of the Public Affairs Office, White Sands Missile Range. The map of Trinity Base Camp dated 19 May 1945 (see Figure 3) is redrawn from a copy on file in the National Archives and Records Center, College Park, Maryland. It has been modified by the addition of several structures and features. The number sequence used in this report to identify individual buildings and structures is that shown on the original 19 May map. We added letter designations for structures that were built after the map was drawn, and to distinguish between the several barracks (all numbered 20

on the original map). The buildings had other numbers posted on their facades—the mess hall, we know from a photograph, was T-994—but we have not found these numbers in any record to date.

Davis believed that the panorama photograph was taken some time after the atomic test. In part, he based this on the presence of some buildings that were not there when he first arrived at Trinity Base Camp and accordingly must have been built during a later phase of construction. He also based this assumption on the relatively small number of vehicles in the photograph, indicating that most of the camp's population was already gone.

The report is divided into two major sections, history and structures. The history section presents a brief background of the Trinity Project, and the selection of the site and its development as documented in archival records, photographs, and the words of the veterans interviewed. The second section is a description of the individual buildings and structures, of which only the two ranch houses, two water towers, and earthen tanks survive intact. The rest of base camp is part of the archaeological record. Appendix A provides a more detailed biography of the 10 veterans interviewed. Appendix B contains selected archival documents relating to Trinity Base Camp buildings, personnel, and equipment at Trinity.

TRINITY BASE CAMP: HISTORY

Trinity Base Camp (Site LA 82956) was originally the headquarters of a cattle ranch that came to be known as the McDonald Brothers Ranch in the 1920s (Figure 1). The identity of the original rancher is unknown. Architectural evidence suggests that the adobe ranch house was built about 1910 (Rieder and Lawson 1995:51). The earliest mention of the property in Socorro County tax records, a tax payment for "improvements made on government land," was recorded in 1925. Vivian Eanes received a stock-raising homestead patent to 640 acres in 1927, and sold the ranch to the McDonald brothers the same year for $100 (Rieder and Lawson 1995:51).

Rube and Dave McDonald and Dave's wife Mertis lived in the adobe ranch house year-round. In 1935, Rube married Ria Lee, and she joined them at the ranch. Rube McDonald subsequently sold his interest in the ranch to Dave and Ross McDonald. In 1938, Ross McDonald built a frame house at the ranch. Until 1942, the brothers ran up to 500 head of cattle on their patented section and additional leased land. In early 1942, the U.S. government established the Alamogordo Bombing Range, consisting of some 1,267,200 acres leased from private owners. In some cases, where titles were not clear or the owners refused to make a deal, the land was condemned.

In early 1943, American and foreign-born physicists, chemists, metallurgists, engineers, and military technical experts assembled at Los Alamos, New Mexico, to build an atomic weapon. They were organized by project director J. Robert Oppenheimer into research and technical divisions and groups that addressed two main issues: solving the theoretical and experimental problems of a fission bomb, and solving the problems of weapon design and construction. On 16 July 1945, the project culminated in the detonation of the world's first atomic fission bomb at Ground Zero, 9.5 miles north of Trinity Base Camp.

The effort was driven by the belief that Nazi Germany was close to building an atomic weapon. One reason for supposing this true was that American and German scientists began the war with substantially the same theoretical understanding of nuclear fission—information that was the common property of the world's experimental physicists. As it turned out, however, although Germany did initiate a nuclear fission project, it never came close to building an atomic bomb. Hitler did not try to understand nuclear physics, and what his advisors told him led him to conclude that an atomic bomb was a remote possibility. It was something he would not live to see, he told Albert Speer (he turned out to be right). By its nature, the Nazi dictatorship was not capable of creating the vast scientific-civilian-military structure in which some of the world's foremost scientists would freely dedicate themselves to a governmental and military objective, a scenario necessary to accomplishing the job. It is one of the twentieth century's abounding ironies that the bomb, in great measure a response to Hitler, could never have been built without the dedication of the physicists—most of them Jewish, whether observant or not—who were forced out of Europe by the Nazis.

Figure 1. The Ross McDonald Ranch (aka McDonald Brothers Ranch), 1935 (enlargement of a section of a Soil Conservation Service aerial photograph). *Courtesy National Archives, College Park, Maryland.*

The project is generally known as the Manhattan Engineer Project, or Y Project. The organization that carried out the project was officially designated the Manhattan Engineer District, a branch of the U.S. Army Corps of Engineers (Szasz 1984:13). The project culminated in a test called Project Trinity. To conduct the test, the Manhattan Engineer District built a scientific, experimental, and military complex in the Jornada del Muerto of south-central New Mexico. The scientists, civilian workers, and military personnel who carried out the test lived in what became known as the Trinity Base Camp.

The Manhattan Engineer District

The Manhattan Engineer District (MED) was established by General Order 33 of 13 August 1942, issued by the Office of the Chief of Engineers (OCE). It began operations on 16 August 1942. Its headquarters were in New York City from August 1942 to August 1943, and in Oak Ridge, Tennessee from August 1943 to December 1946. Leslie R. Groves was appointed commander of the MED on 27 September 1942. The mission of the MED was to direct and coordinate research and related activities leading to the development of an atomic bomb. At the end of WWII, the MED's property and personnel were transferred to the Atomic Energy Commission (AEC), as provided for by Section 9 of the Atomic Energy Act of 1946 and Executive Order 9816 of 31 December 1946. The Armed Forces Special Weapons Project (AFSWP) was established by a joint letter from the Secretaries of War and Navy dated 29 January 1947. The AFSWP was headed by General Groves. It assumed responsibility for military functions related to atomic energy, and worked in cooperation with the AEC. By General Order 14, issued by OCE on 8 August 1947, the MED was abolished effective 15 August 1947 (Administrative history of the Manhattan Engineer District prepared by Dwight Wilbanks, National Archives and Records Administration 5/16/96).

Groves and Oppenheimer

Leslie Richard Groves, born in Albany, New York, and the son of a lawyer, was a West Point graduate, 46 years old in 1942. When the Secretary of War selected him to head the Y (Manhattan) Project, he was a colonel, deputy chief of construction for the U.S. Army, and had just finished building the Pentagon. He wanted a combat assignment and was disappointed—the Manhattan Project was tiny, in dollar terms, compared to what he had been doing and had no assurance of success. He was compensated with a promotion to brigadier general. Groves was tall, jowly, fat, and getting fatter. He was a gifted and dedicated engineer, a career soldier. He had a reputation as a loner, a man of inexhaustible energy, a man with unfailing confidence in his own judgment. He was blunt and hot-tempered. Subordinates and superiors relied on him, but did not greatly like him. Groves's aides were General Thomas F. Farrell and Colonel K.D. Nichols.

Our informants did not remember Groves with affection. One told a story, made of whole cloth but perhaps believed by some of the military personnel at the time, of Groves being temporarily placed under arrest by Lieutenant Howard C. Bush, who commanded the military police at Trinity, to restrain his supposedly erratic behavior before the atomic test. Kunetka (1982:8) reports that J. Robert Oppenheimer roamed around that night until Groves ordered him to go to his tent—this may be the grain of truth in the story.

Groves was in command of all military and scientific activities of the Manhattan Engineer District—activities that stretched across the United States, involved thousands of civilian and military personnel, and expended billions of dollars. He also commanded strike forces operating in Europe. In late 1943, Groves authorized a unit called "Alsos" (Greek for 'grove'). He chose Lieutenant Colonel Boris T. Pash to head the mission. Pash was an FBI-trained, U.S. Army G-2 security officer and a Communist-hunter who had interrogated J. Robert Oppenheimer about his Communist affiliations (he secretly taped Oppenheimer and concluded, without any direct evidence, that the physicist was a secret Communist Party member). Pash set up a base in London in 1944. He then took a squad into France (it was the first American unit to enter Paris, accompanying Free French forces). Pash subsequently investigated a German physics laboratory in Strasbourg and removed uranium ore from a French arsenal in Toulouse. Pash and his forces, including a battalion of combat engineers, advanced to Haigerloch on the Eyach River (under German fire part of the way), occupied the town, located the Nazi atomic research facilities there (including an atomic pile), and detained the German atomic scientists themselves, including Otto Hahn and Werner Heisenberg.

Groves also assembled a mixed British and American strike force, led by Lieutenant Colonel John Lansdale, Jr., to confiscate 1,100 tons of uranium ore stored in Stassfurt, Germany.

Groves selected J. Robert Oppenheimer as scientific director of the Y Project. Oppenheimer was the first of two sons in a well-to-do, nonobservant, New York Jewish family. His father, an immigrant from Germany, had worked his way to the ownership of a textile-importing company. When Groves first met him in 1942, Oppenheimer was 38 years old and a professor of theoretical physics at the University of California, Berkeley, and at the California Institute of Technology. He was one of the early American experts in quantum mechanics and the founder of a school of theoretical physics that produced many of the leading American theoreticians. He was a polymath who studied Sanskrit and read philosophy, and a leftist with Communist associations that later caused him to be pilloried during loyalty hearings in 1954. Oppenheimer was born in New York City, but he had spent the summer of 1922 in New Mexico for his fragile health. During this visit, he went on a pack trip through Frijoles Canyon and up into the Valle Grande. Twenty years later, he suggested that the Los Alamos Ranch School for Boys, founded in 1917, should be the site of a new physics laboratory.

Living and working at Los Alamos and down in the Jornada del Muerto, Oppenheimer became the most influential New Mexican of the twentieth century, the prime mover of a new society and a new economy, with an influence on the place and its people that can only be compared to that of Juan de Oñate and Diego de Vargas.

He met Groves when the general came to Berkeley from Chicago on an inspection tour in October 1942. Oppenheimer told Groves that the development of an atomic bomb required a central laboratory; that compartmentalized experimental studies, which Groves preferred for the sake of security, should be eliminated in favor of a unified program to work on physical, chemical, metallurgical, engineering, and ordnance problems. Groves and Oppenheimer talked about creating a military laboratory in which key personnel would be commissioned as officers. This did not happen because the scientists indispensable to the project were all civilians, mainly academics, with strong convictions about the primacy of research and no inclination to become military men, even temporarily. They were willing to help achieve a military objective—some of the best minds among them were refugees from Nazi-dominated Europe—but they rejected any suggestion of subordination.

Groves needed a director for the laboratory. He eliminated several possible choices: Ernest O. Lawrence at Berkeley was indispensable to critical research in electromagnetic isotope separation; Arthur H. Compton was likewise indispensable at the University of Chicago. Harold C. Urey at Columbia University was a chemist, not a physicist. Groves chose Oppenheimer despite various apparent drawbacks—Oppenheimer had no experience as director of a large number of people; he was a theoretical rather than an experimental physicist; he had never won the Nobel Prize (many of the scientists who were being drawn into the project had); and he had Communist associations, including his former fiancee, his wife, his brother, and his sister-in-law. Groves chose Oppenheimer because he could find no better candidate and because he was convinced—on very brief acquaintance and with the certainty that characterized Groves, who knew nothing about physics—that Oppenheimer was a great scientific mind who would succeed in the immense and unprecedented task of creating an atomic weapon. Groves and Oppenheimer discussed the appointment on a train trip from Chicago to New York on 15 October 1942. The two then met with Vannevar Bush, director of the Office of Scientific Research and Development (the link between the scientific community and the defense establishment) and a close advisor of President Roosevelt, in Washington on 19 October. Apparently, the decision to appoint Oppenheimer was confirmed then.

New Mexico

Groves gave the job of finding a site for the new laboratory to Major John H. Dudley of the Manhattan Engineer District. Groves told Dudley to find a place with room for 265 people, a location at least 200 miles from any international boundary but west of the Mississippi, some existing facilities, and a natural bowl with nearby hills so

that fences could be built around the site. Dudley surveyed the Southwest by plane, train, car, jeep, and horse. He recommended Oak City, Utah, but that would have meant evicting dozens of families and removing farmland from production. Dudley's second choice was Jemez Springs, New Mexico.

Oppenheimer came to look at it on 16 November 1942. He found Jemez Canyon confining, and he already knew about the mesa-top Los Alamos Ranch School for Boys. He proposed the school to Groves, who had joined the tour of inspection, as the site for the laboratory. In short order, the War Department notified the owners of the school that the government was starting condemnation proceedings. The school was given until February 1943 to close down, and Oppenheimer began to crisscross the country to recruit personnel.

The Albuquerque District of the Corps of Engineers chose the M.M. Sundt Company of Tucson (which was just finishing a contract near Las Vegas, New Mexico) to build Los Alamos. The Army also hired Willard C. Kruger and Associates of Santa Fe as architect-engineer. The 54 school buildings became the nucleus of a new community, with new houses, dormitories, barracks, and service and other buildings to the northeast and the technical area, surrounded by a chain link fence, to the south along the rim of Jemez Canyon.

In January 1943, there were about 1,500 people on the site—most of them Sundt employees. A year later, there were 3,500; and in January 1945 there were about 5,700.

Groves liked neither the outside contractor nor the Albuquerque District on his site. Early in 1944, the Manhattan Engineer District took responsibility for all new construction. The post commander created an Operations Division in two sections—one for community maintenance and construction, and the other for technical work. Work crews were made up of civilians and enlisted men of the Provisional Engineer Detachment. They did a variety of construction and maintenance work ordinarily performed by construction contractors.

The Choice of the Trinity Site

In March 1944, George Kistiakowsky, a Russian-born physicist who was the deputy division leader for the program experimenting with creation of an implosion device, formed a group to deal with the development of high explosives to be used in an implosion mechanism. One of the tasks of this group was to prepare for a full-scale test of an atomic weapon. Kistiakowsky appointed Kenneth T. Bainbridge to lead this group. Bainbridge was a Harvard physicist who had served for three years on the staff of the MIT Radiation Laboratory before coming to Los Alamos in the Spring of 1943. Bainbridge immediately began looking for a test site. Groves himself established certain conditions: the site must be about 17 by 24 miles, it must be located in a generally unpopulated area, and it must be no further from Los Alamos than necessary. Groves

ruled out Los Alamos itself; it was not big enough. He also imposed a prohibition: the area could have no Indians in it. "I wanted to avoid the impossible problems that would have been created by Secretary of the Interior Harold L. Ickes, who had jurisdiction over the Bureau of Indian Affairs. His curiosity and insatiable desire to have his own way would have caused difficulties..." (Groves 1962:289). Groves did not bother to say that Ickes was one of President Roosevelt's closest confidants.

Bainbridge considered San Nicolas Island off the California coast; a site in the Army's Desert Training Center near Rice, California; sand bars 10 miles off the coast of Texas near Corpus Christi; the San Luis Valley of Colorado; and several possible sites in New Mexico.

Major Peer de Silva (head of security at Los Alamos), in a memorandum dated April 1944, characterizes the effort as a search for a site for Jumbo—a steel vessel that was to be fabricated to contain the scarce plutonium if the high-explosive lenses surrounding the core exploded, but no nuclear reaction followed.

Oppenheimer told the others that if the Jumbo site was close to Los Alamos, it would be

> ...the most elementary type of field camp in which tents would provide housing, messing facilities, etc. Travel into the nearby towns would be prohibited except for that necessary to go back and forth to Project 'Y'.
>
> Only those persons whose presence at the site was absolutely necessary would be advised of its location and allowed to go there. ...There would be no unnecessary travel back and forth between Project "Y" and this site, ...It is to be understood, however, that no definite decision has been made concerning the selection of a test site. Much will now depend upon whether or not Jumbo itself is a feasible endeavor. (Memorandum from Major Peer de Silva to Lieutenant Colonel E. B. Parsons, U.S. Engineer Office, Oak Ridge, Tennessee, 9 May 1944)

The search was underway by the end of April 1944. The 9 May memorandum shows that Oppenheimer, Bainbridge, Major W. A. Stevens (in charge of construction at Los Alamos), and Major de Silva looked at an area "north and west of Albuquerque" on 29 April. De Silva noted in his memorandum that this area was suitably remote, but "presented overwhelming difficulties from an engineering standpoint in that the country was frequently rutted by deep arroyos and washes." He also noted that "this area was particularly complicated by the presence of numerous Indian settlements, the removal of which would have required action by the Department of the Interior." De Silva mentions that they stayed overnight at Grants, so his description may be of the Acoma-Laguna area.

On 30 April, the party went down to the Malpais and through Zuni Canyon. South of the Malpais they looked at the North Plains. "There were no habitations other than transient sheep camps which consisted, in almost every case, of a well and a

storage shed," de Silva wrote. De Silva and Stevens went back and looked at the area from an airplane on 5 May and thought it looked feasible. On 8 May, however, Oppenheimer told those at a staff meeting that Bethlehem Steel Company, one of the companies contacted about building Jumbo, was unable to build the vessel to the desired specifications. According to de Silva, "this...left the entire matter again in the air..."

An Ohio company that could build Jumbo was found and the vessel was ordered in June, while the consideration of test sites continued. In September 1944, Bainbridge finally decided on a site in the northwest corner of the Alamogordo Bombing Range. One factor was the proximity of this site to Los Alamos—only 160 miles away. The nearest town was 27 miles away, there were two federal highways (85 and 380) nearby, and the main line of the Santa Fe Railroad was close. The flat terrain would minimize extraneous blast effects and make the building of roads and communications lines easier, the weather was usually clear and sunny, and the site was already part of an air base. All these factors made the Jornada del Muerto the best available choice.

Groves (1982:289) says that the site was chosen by Bainbridge with the assistance of Oppenheimer, Stevens and de Silva.

An internal memo from Bainbridge to de Silva dated 19 October 1944 shows that an agreement had not been reached between the 2nd Air Force and the Alamogordo Bombing Range for the use of the Trinity Site as of that date. The area requested was 18 miles east-west and 24 miles north-south, comprising Townships 6, 7, 8, and 9 South of Ranges 3, 4, and 5 East. By early November, the project leaders had worked out an agreement with the Air Force.

The McDonalds

Among the properties the Army leased was the David McDonald Ranch. The ranch headquarters house became the site for the assembly of the atomic bomb. Tract 35, consisting of 21,518 acres held by the McDonald Brothers (including one deeded section), was one of those condemned. Of the 21,518 acres, 18,638 acres were federal land and 2,240 acres were state land. Ross McDonald did not move his stock. Although the MPs tried several times to drive the cattle out of the area, they failed, "due to the large amount of property involved together with the rough terrain" (affidavit of Perry M. Crawford, Post Engineer, 18 October 1945).

The original leases taken by the Army were due to expire on 30 June 1945. In March 1945, the government unilaterally extended them all for an additional year under a renewal clause in the contracts.

Ross McDonald had bought the ranch, then known as the Eanes Ranch, in 1927. His father, Tom, had ranched for many years in the area, as did his three brothers.

In January 1942, his Taylor Grazing Act rights were canceled and in April he was told to vacate the premises. In an affidavit dated 27 September 1945, he said that he had not been able to find all his cattle, but gathered them on 2 May 1942. McDonald leased other pasture, but he ran out of grass on his leased pasture. He had heard that other ranchers had never moved their cattle, so he brought his stock back to his old range on 1 July 1944 (but he did not try to move back into his headquarters).

On 9 November 1944, the commanding officer of the Alamogordo Air Base, Colonel Roscoe Wriston, sent the Provost Marshall to order McDonald to move his cattle off in 30 days. He was also told that his buildings and water would be taken by the Army immediately. He contracted to sell his cattle, having no place to take them. He rounded up and removed the cattle on 27 November 1944, but he was short "ten cows, four calves and one two-year-old steer....I did not have time to continue searching for these animals as they had to be at the stockyards at Oscura, New Mexico, on the 29 November 1944 because the buyer was waiting for them there" (affidavit of Ross McDonald, 27 September 1945).

By telegram, McDonald asked permission to go back to look for his remaining stock. This request was refused. Subsequently he signed, under protest, a contract for compensation, but his brother David McDonald refused to sign. Ross received a check in December, payable to him and his brother, but he refused to accept it because, he said, it was for a fraction of the amount stated in the contract he had signed ($2,190 rather than $5,300).

In October 1945, Captain Howard C. Bush signed an affidavit saying that "stray animals, of all types, when found, are driven to the nearest boundary line. No attempt is made by me to determine ownership, as all such animals are trespassers..." (Statement of Howard C. Bush, County of Otero, State of New Mexico, subscribed and sworn before Major Patrick A. Doyle, Army Corps of Engineers, Army Air Base, Alamogordo. Record Group 77, Entry 5, NARS). He added that he had tried to find Ross McDonald's 15 head, without success.

On 5 July 1945, eleven days before the atomic test, Captain Henry Aikens, adjutant to the commander of the Alamogordo Air Base, wrote to McDonald's lawyer, John E. Hall in Albuquerque, to say that the base legal officer, Major Patrick A. Doyle, and the Provost Marshall, Captain Thomas C. Cornett, Jr., had searched the area and failed to find the cattle. From their report, it appears that it was just the two of them (Imagine what the ranchers might have said to the spectacle of a legal officer and provost marshall going out to round up cattle.). Aiken told Hall to notify McDonald that he could make a claim for the cattle under the provisions of A.R. 25-20.

As Alamogordo Air Base Claims Officer, Major Doyle wrote a report dated 21 October 1945 to the Claims Judge Advocate at Kelly Field in Texas. Doyle said that he had investigated Ross McDonald's claim for compensation for fifteen head of cattle. He stated that McDonald had trespassed on the property and that, as a trespasser, he could

not maintain a claim for damages. "In the opinion of the undersigned, the litigation concerning this property in the vicinity of the McDonald Ranch will go on indefinitely, possibly for a number of years..." (Memorandum to Claims Judge Advocate, San Antonio Air Technical Service Command, Kelly Field, Texas; from Major Patrick A. Doyle, Base Claims Officer, Alamogordo Army Air Field, Alamogordo, New Mexico. Records Group 77, Entry 5, NARS).

Although a committee of project leaders with responsibility for overall direction of the implosion program was called the "Cowpuncher Committee," the project leaders had no sympathy for ranchers who, they felt, were obstructing the project that would defeat Fascism. The story of the McDonalds is a pocket mirror of the vast changes that swept New Mexico during World War II. The state that had lingered in the nineteenth century was wrenched into the twentieth by the immense effort to defeat the Axis powers. Propelled by tremendous events, the scientists and soldiers had no thought to spare for an earthbound rancher who saw his life and livelihood suddenly disappearing the same way the Pond family had lost the Los Alamos School and the Hispanic settlers on the Pajarito Plateau had lost their homesteads.

Naming the Site

Kenneth Bainbridge named the living and working area "Base Camp" (Kunetka 1982:148). Oppenheimer came up with the code name "Trinity" for both the test and the test site sometime between March and October 1944. In a letter to Groves in 1962, Oppenheimer said,

> I did suggest it....Why I chose the name is not clear, but I know what thoughts were in my mind. There is a poem of John Donne...
>
> 'As West and East
> In all flatt Maps—and I am one—are one,
> So death doth touch the Resurrection.'
>
> That still does not make a Trinity, but in another, better-known devotional poem Donne opens, 'Batter my heart, three person'd God;—Beyond this, I have no clues whatever.
> (Rhodes 1986:571-572)

And Rhodes comments (1986:572), "The fourteenth of Donne's Holy Sonnets equally explores the theme of a destruction that might also redeem."

Existing Improvements

A secret internal report (in Record Group 434, National Archives, College Park) prepared around 16 October 1944 notes the railroad siding at Pope and says that "it is

quite satisfactory for transportation of Jumbo." The siding was a "long by-pass siding... approximately 35 miles [actually closer to 28 miles] due west of the proposed site." The report also states that 10 miles of existing roads were present at the test site.

According to the same report, gravel for concrete was available "within eight miles of the gadget location," and "larger stone is available at a mine dump one mile further distant." This may refer to the mine in Mockingbird Gap, from which the "Lazy MP Ranch" building was brought to Trinity (see below).

Among the improvements at the ranch headquarters were two houses (Nos. 13 and 16), a well (No. 10), three water-storage tanks (Nos. 4, 5, and 8), a pump house (No. 11), a hay barn (No. 12), a shed (No. 14), a garage (No. 15), two dirt tanks, and a set of corrals.

Plans and Construction

Captain Samuel P. Davalos, post engineer at Los Alamos in charge of the Operations Division's Technical Area Section, worked with Kenneth T. Bainbridge and his Project Trinity group to develop plans for the base camp, including a bomb test area with technical facilities and a campsite to serve at least 160 men (Jones 1985:478). Figures 2 and 3 show the layout of the camp. Figure 2 is an aerial photograph of Trinity Base Camp in July 1945. Figure 3 is a reproduction of Robert Gibson's map of the camp dated 19 May 1945.

A memorandum dated 10 October 1944 by Davalos (1944) calls for "a 20-by-100-ft MP barracks that can hold 50 men, a 20-by-100-ft Special Engineer Detachment (SED) barracks for an additional 50 men, another SED and technical staff barracks for 50 men, a 20-by-60-ft service and supply personnel barracks for 30 men, a 20-by-100-ft structure to serve as an office, laboratories and instrument maintenance, an officer's quarters, and a latrine to serve 150 men." Davalos also states that "there will also be a 20-by-150-ft mess hall and kitchen, a 20-by-50-ft commissary and supply warehouse, a 30-by-50-ft repair shop, and a 30-by-50-ft warehouse for technical supplies and storage." This memorandum assumes the use of portable generators and a telephone connection to the Mountain States Telephone Company line 4 mi from Base Camp (Record Group 434, "Construction and Equipment Requirements for Proposed Test Site, Trinity").

General Groves approved construction at Trinity in a one-paragraph letter to J. Robert Oppenheimer dated 1 November 1944. Groves wrote that he had "approved the necessary construction at Trinity," but that he was, "...counting on you to insure that the attention and interest of key scientific personnel is not needlessly diverted to this phase of our problem. I feel that you must limit attention to this to the absolute minimum personnel and effort by that personnel" (Record Group 434, Department of Energy).

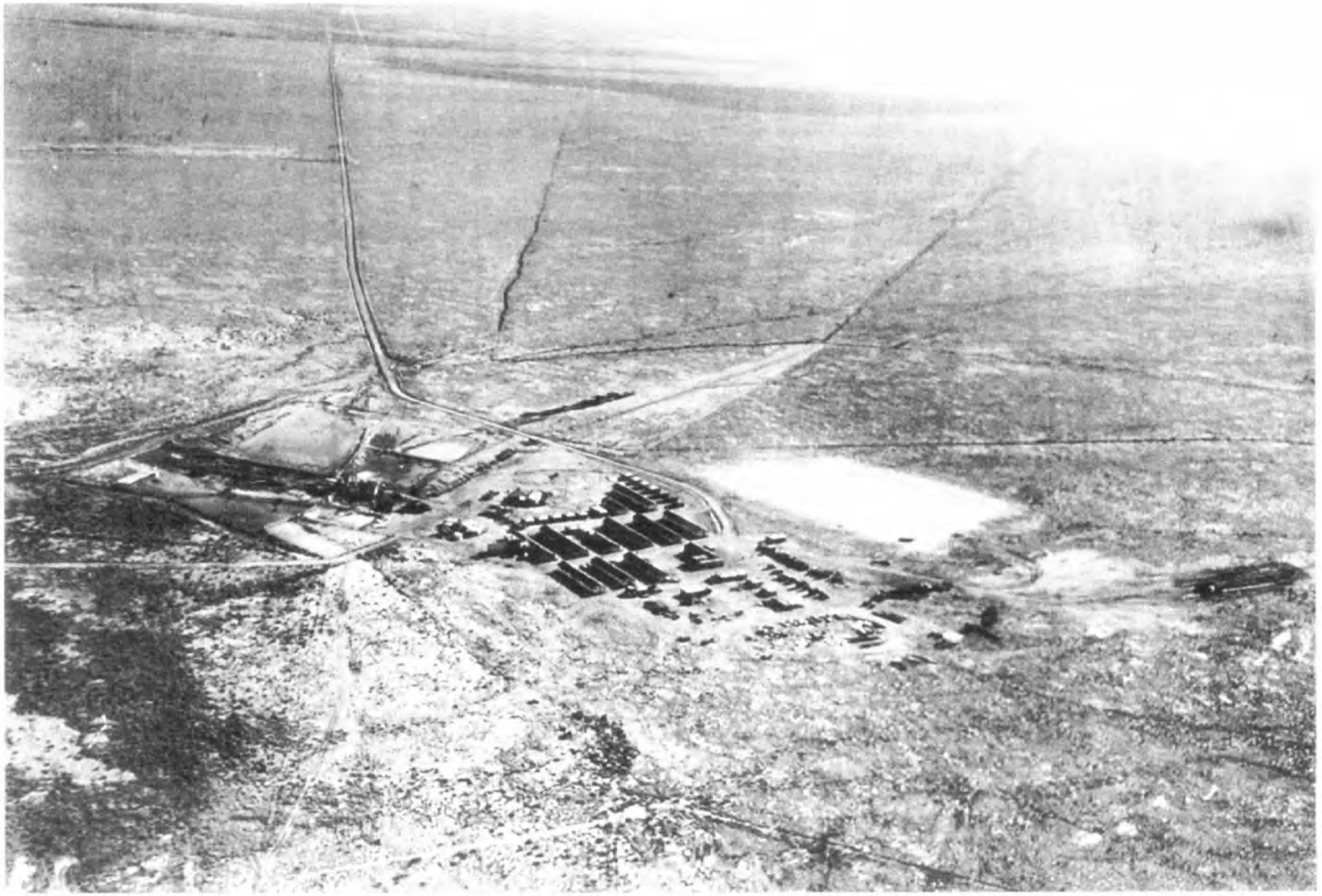

Figure 2. Aerial photograph of Trinity Base Camp, July 1945. This may have been taken from a small, fixed-wing plane using a conventional camera. *Courtesy National Archives, College Park, Maryland.*

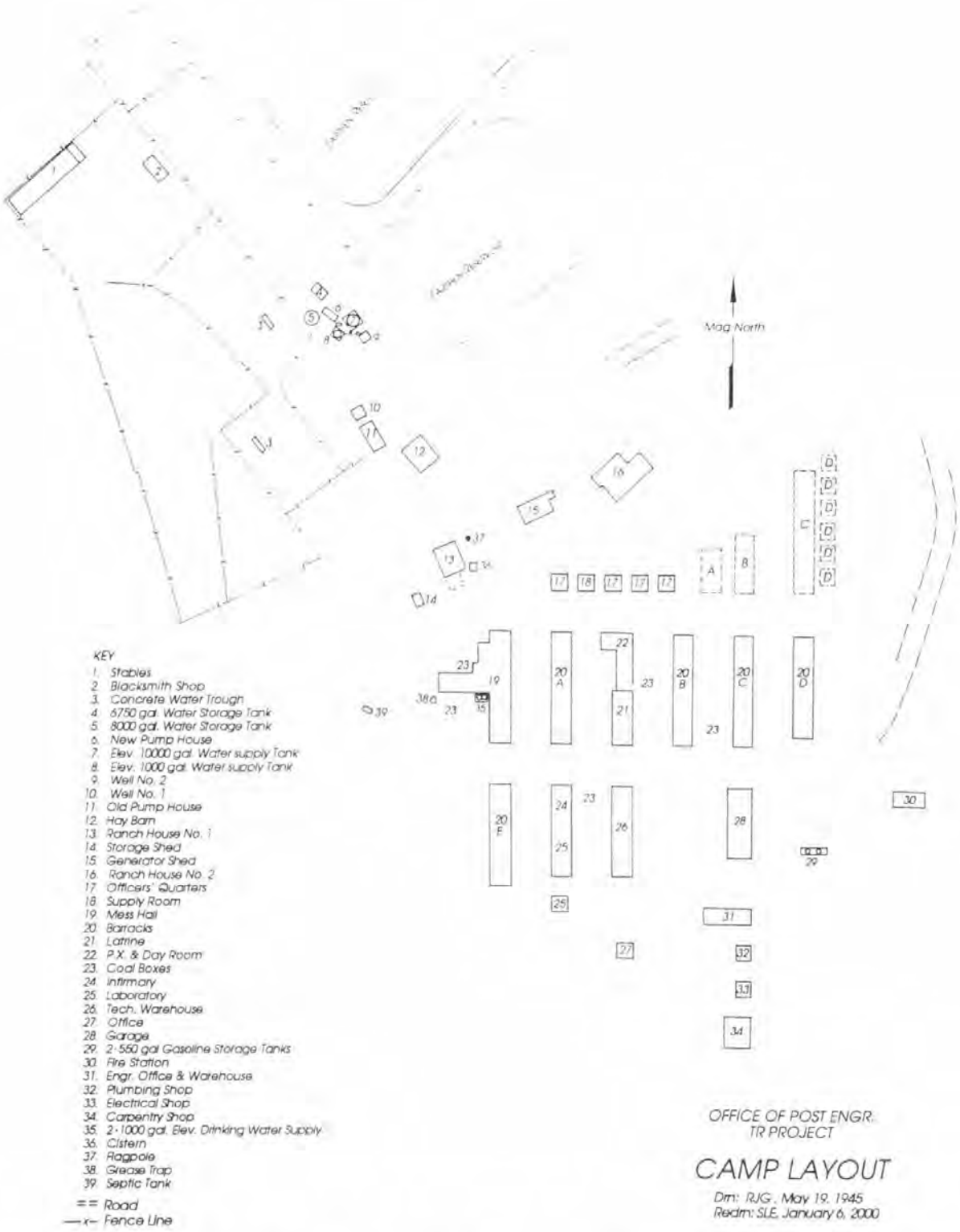

Figure 3. Map of Trinity Base Camp, adapted from a map by Robert J. Gibson, assistant post engineer at Trinity, dated 19 May 1945. Dashed lines indicate structures added after May 1945. *Courtesy National Archives, College Park, Maryland.*

In so saying, Groves casts some lateral light on our contemporary perception of Trinity. We may think of it in retrospect as a near-mythic event, a superhuman effort of chosen mortals, but Groves worried that the test would take time and attention from the central issues, which he describes as "scientific." In supposing that the test might take on a life of its own, Groves was right—the test has become a myth, a metaphor, and a warning to all future generations. The unprecedented event, which its makers struggled to understand and to describe to us, remains fundamental and astounding even today, perhaps the more so because it had the character of a scientific experiment rather than an act of war.

General Groves signed a construction directive on 8 November 1944, approving construction of three 20-by-100-ft barracks, a 20-by-60-ft barracks, a 20-by-100-ft officer's quarters and office, a latrine, a mess hall with kitchen, a 20-by-50-ft commissary and quartermaster's supply warehouse, a 30-by-50-ft building for repairs, and a 20-by-50-ft warehouse (Memorandum titled "Subject: Construction Directive." From L. R. Groves to District Engineer, U.S. Engineer Office, Albuquerque. 8 November 1944. Record Group 434, NARS). Davalos estimated that it would cost about $11,000 to assemble and complete all the buildings.

Bainbridge marked Ground Zero about 3,400 yards northwest of the George McDonald Ranch house. "From that center, Corps of Engineers contractors built earth-sheltered bunkers with concrete-slab roofs..." (Rhodes 1986:653). South 10,000 was the control bunker for the test. The base camp took shape six miles south of South 10,000. Campana Hill (so called from its bell shape, but always referred to by the project personnel as 'Compañia Hill') was chosen as a VIP overlook because it lay well to the north and had an unobstructed view of Ground Zero.

The Civilian Conservation Corps (CCC) buildings that made up most of the base camp were released by the Albuquerque District, Army Corps of Engineers about 9 October 1944. The 10 October 1944 Davalos memorandum refers to "CCC portable buildings" that are "available in Albuquerque and have been ear-marked for our use." The memorandum estimates that it will take three weeks to dismantle the buildings, truck them to Trinity, and reassemble them there. Ten buildings are specified (Davalos 1944). Figures 4 and 5 are photographs of Trinity Base Camp. Figure 4 was taken in the Spring of 1945. Figure 5 was probably taken after the 16 July 1945 atomic test.

The CCC had been created by Executive Order 6108 on 15 April 1933. It became part of the Federal Security Agency in 1939. The CCC was an interagency organization. The War Department trained enrollees for two weeks at military bases and built the camps to house and feed them. Then, Department of Agriculture and Interior land-management agencies (including the National Park Service, Soil Conservation Service, Forest Service, Bureau of Reclamation, and Office of Indian Affairs) took the young men of the CCC, the "enrollees," out on daily assignments (construction, flood control, reseeding, landscaping, tree planting, fencing—a hundred development and

Figure 4. Trinity Base Camp, Spring 1945. Note that there are only two hutments at center left. The recreation hall and latrine at center are separate structures. The staff car is a 12-passenger Packard Clipper limousine. The two other vehicles appear to be Dodge 4x4 Carryalls. The fourth vehicle is an unidentifiable truck, possibly a 6x6. *Courtesy Los Alamos National Laboratory.*

conservation-related tasks). With the nation at war and most of the original enrollees in the armed forces, the CCC's authorization ended in 1943.

Kammer (1994) notes the existence of four CCC camps in or near Albuquerque: winter quarters at Juan Tabo F-26-N, established in 1933-1934, and the summer camp, Camp Lew Wallace, in the Sandia Mountains; Camp SCS-9-N, established in 1935 on the Rio Puerco; Camp SCS-27-N, established in 1941-1942; and Camp ASCS-1-N, established in 1942.

Since the War Department owned and controlled the CCC camps, many of the buildings and facilities were requisitioned for military use during WWII and others were sold off to private individuals.

An inventory of structures and improvements as well as a map for each CCC camp built up to about 1940 is contained in Record Group 77, File 395, "Historical Record of Civilian Conservation Corps Camp Buildings" by state, 1935-1940, in 34 volumes (in National Archives, College Park, Maryland). These records indicate that the most likely source of the Trinity Base Camp structures was Camp SCS-9-N (Figure 6), 27 mi northwest of Albuquerque on the Rio Puerco. This Soil Conservation Service camp consisted of a mess hall (120 by 20 ft) and kitchen (55 by 20 ft), a recreation hall and five barracks (each measuring 20 by 100 ft), and an officers' quarters (20 by 100 ft). No other camp in the Albuquerque vicinity is shown as having buildings of this size. The enrollees at Camp SCS-9-N had carried out agricultural projects, including seed collection, water spreading, tree planting, rodent control, and construction of check dams and terraces (Kammer 1994:C-6).

Contracts for assembly of the camp were let in early November 1944. The creation of the camp included assembling the prefabricated buildings, skidding in at least one historic structure (the "Lazy MP Ranch" [see below]), and pouring foundations for the latrines and motor pool. Marvin R. Davis (personal communication 1998 and 1999) explained that the principal structures arrived on the site in sections (e.g., walls and floors), then were bolted together. Captain Davalos and a civilian engineer, Joe B. Sanders, from the Socorro office of the Army Corps of Engineers, oversaw the construction by a crew sent out by the J.D. Leftwich Company of El Paso, Texas.

According to Davalos's 10 October 1944 memo, the total cost for construction of the camp as originally designed and for preparation of the test site was estimated at $108,400. The cost of dismantling, transporting, and reassembling the six large (20 by 100 ft) buildings was estimated at $8,500. The cost of dismantling, transporting, and reassembling the four smaller buildings (20 by 50 ft) was estimated at $5,100. The cost of the camp alone (including water, electricity, telephone, and roads, but not including the bunkers, other structures, and miscellaneous construction of the test site) was estimated at $20,600.

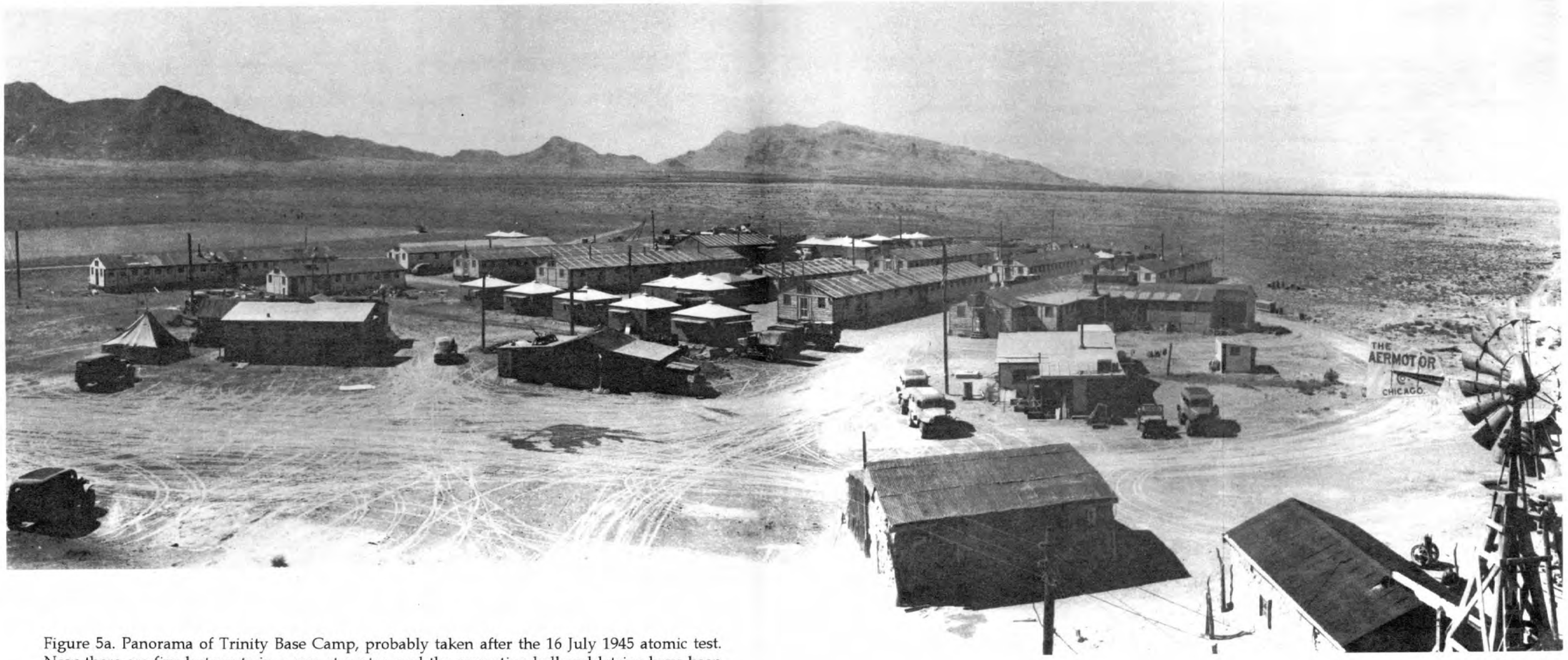

Figure 5a. Panorama of Trinity Base Camp, probably taken after the 16 July 1945 atomic test. Now there are five hutments in a row at center, and the recreation hall and latrine have been joined by an intervening structure (the Post Exchange). Vehicles appear to be Dodge 4x4 Carryalls near the flag pole (3) and to the east (2); Dodge 4x4 weapons carriers near hutments (2); a jeep; and two unidentifiable cars in the east camp area. *Courtesy U.S. Army, White Sands Missile Range Public Affairs Office.*

Figure 5b. Trinity Base Camp, Spring 1945. Numbers designate buildings identified in Figure 3. *Composed by Jo Ruprecht.*

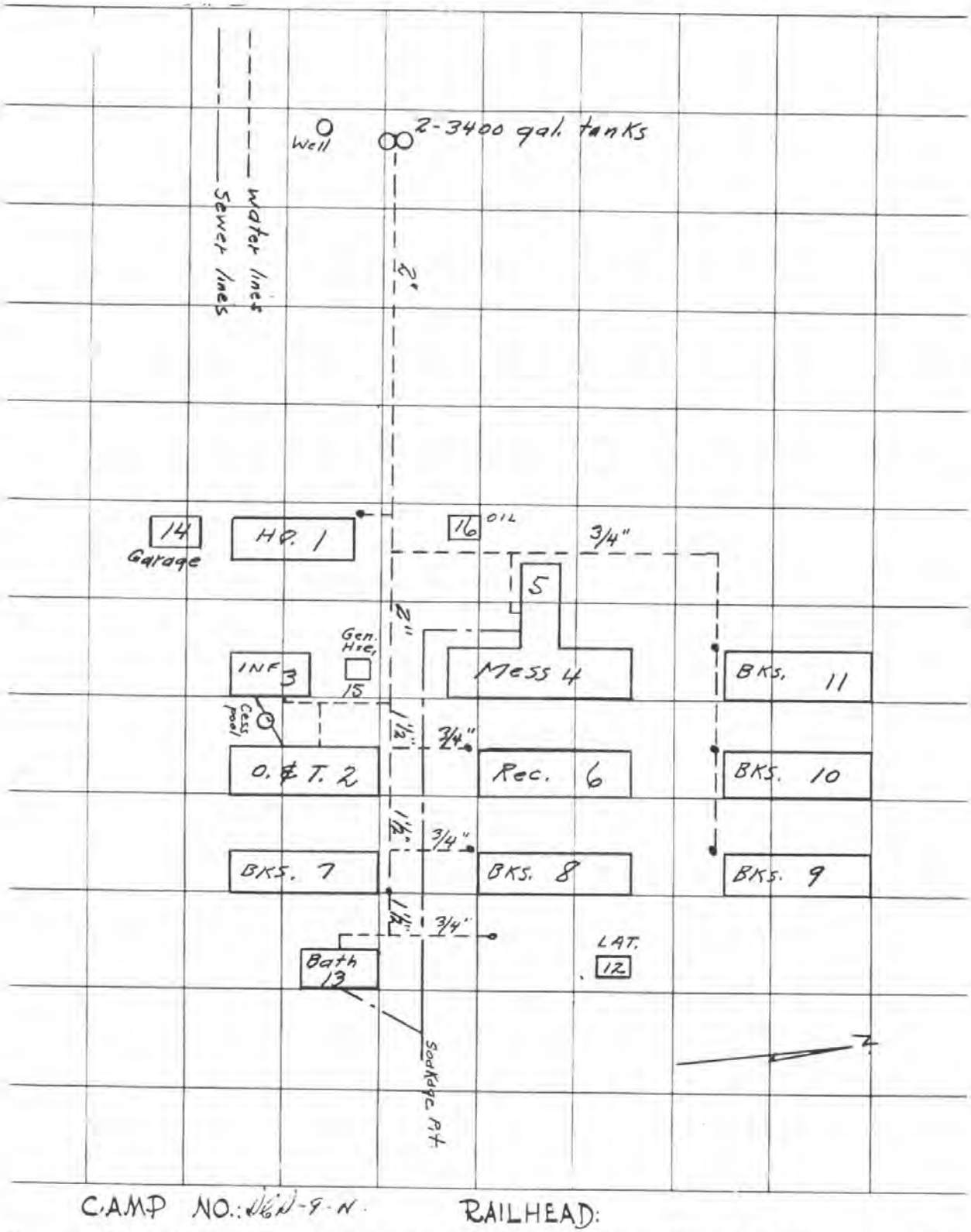

Figure 6. Plan of Camp SCS-9-N on the Rio Puerco, 27 miles northwest of Albuquerque. This camp, occupied by Civilian Conservation Corps "enrollees" ca. 1935-1940, is one possible source for the Trinity Base Camp structures. *Courtesy National Archives, College Park, Maryland.*

A 4 December 1944 memorandum from Project Engineer Joe B. Sanders shows that Leftwich's crews were responsible for wiring the residence buildings; setting a generator on a concrete base; setting up a gasoline engine to power the existing pump for the first ranch well (No. 10); installing electrical, water, and sewer systems; repairing the walls and floors of Ranch House No. 2 (No. 16 on map); excavating a pit for servicing cars in the motor-repair building (No. 28); and putting down gravel on the floor of the motor pool (No. 28).

A file memorandum of 7 December 1944, signed by Davalos describes the situation as of 4 December. It indicates that construction had begun. Foundations had been excavated and poured for technical buildings (that is, the bunkers north, south, and west of Ground Zero). Two of three barracks buildings had been erected and were being reroofed. Half of the walls and roof of the mess hall had been erected. The two ranch houses were being rehabilitated and wired for electrical outlets (which evidently they never had before). A concrete slab had been poured in an existing garage for mounting a generator plant (Building No. 15). The combination office-infirmary (No. 24), the warehouse (No. 26), the motor pool (No. 28), and the first latrine (No. 21) had been staked, and Davalos estimated that 80 percent of the building sections were on the site. He also noted that all the mess hall equipment, including the ranges, refrigerators, hot water heating plant, and drinking water storage tanks, were on the site. A subcontractor was installing wiring in the newly erected buildings and a plumbing contractor was laying out ditch lines for sewers. Eight of the 28 miles of new road to Pope had been built, existing roads were being graded, and the Santa Fe Railroad had agreed to build a new siding at Pope.

The camp was ready for occupancy sometime in December 1944. As originally laid out, however, it proved too small (it was designed for a maximum of 160 men and would eventually hold over 300). Rudolph (personal communication 1998) stated that construction continued after he arrived in mid-February 1945, and was more or less continuous while he was at the camp.

The main north-south road to Ground Zero received the name "Broadway." "Vatican Road" and "Pennsylvania Avenue" were laid out east-west. These names may have been thought up by the MPs, who had the task of guarding the roads and needed easy ways to identify them.

MPs and Engineers

The original Provisional MP Detachment No. 1 that served at Los Alamos came from Fort Riley, Kansas, to Los Alamos in early April 1943 (Davis n.d.). Cooks, clerks, and others came directly to Los Alamos; those who had been trained to serve as mounted MPs went to Camp Wolters, Texas, for about two days, then were sent to Lamy and on to Santa Fe by train and up to Los Alamos by bus. At first, there were so few MPs at Los Alamos that they had to serve eight-hour (rather than regular four-

hour) shifts, frequently in Spring rain and snow. They were also put on work details, hauling furniture, sawing wood, and delivering ice to the houses of the scientists and technicians—work that "really griped us," Davis (n.d.) said. This arrangement may be attributed to Groves's dislike of civilian personnel on his territory. At first the MPs, armed only with nightsticks and flashlights, rode the ranch school horses. As winter came on with rain and snow, ice would build up on the horses' hooves so they could barely stand. Davis remembers cleaning his horse's shoes with a broken penknife.

Some horses were brought in from Las Vegas, New Mexico—they proved to be a poor bunch. At length, cavalry horses from El Reno, Oklahoma were delivered. The mounted MPs patrolled around the original Tech Area and along the crest of the mountains above Anchor Ranch as far as the margin of Valle Grande. They rounded up cattle and brought them to corrals opposite Post 19 on the present site of White Rock, where ranchers had been notified to pick up their cattle.

The internal memorandum of 10 October 1944 estimated that a minimum of 133 men and a maximum of 158 or 160 would occupy the test area. These included 45 MPs, an engineer officer, a medical officer, and 41 service personnel, plus 45 technical personnel (Special Engineers).

This memorandum included various staffing figures that were not internally consistent (higher figures may simply be estimated capacities of the various buildings, whereas the breakdowns are closer to the actual numbers). It was estimated in the memorandum that 50 men would occupy an MP barracks, but the memo also states that there was a total of 45 military police. It further states that 50 men would occupy a SED barracks, but offers a breakdown of service personnel, including a project engineer, a medical officer, four cooks, four k.p.s, six mechanics and others for vehicle maintenance, 10 truck drivers and road equipment operators, two medical orderlies, and a miscellaneous construction, maintenance, and repair crew of 15—totalling 43 men. Rudolph (personal communication 1999) thinks that there were actually about 40 men in this last group. In the memorandum, it is assumed that an additional 50 men would comprise a technical staff, but it also lists a total of 45 technical personnel. In the memorandum it is estimated that there would be an average population of 135 men and a maximum of 160. These low population estimates were evidently the reason for the additional construction carried on through the Spring of 1945, visible in photographs and noted by the informants.

A memorandum of 19 November 1944 from Colonel G. R. Tyler (the Corps of Engineers commander in Santa Fe) to Groves revises the personnel estimate. It says that the Trinity Project would require 50 civilians and members of the Special Engineer Detachment, 45 MPs, and 42 enlisted men to take care of messing and maintenance—137 men in all. Tyler assumed that the civilians and Special Engineers would be chosen from existing personnel, but asked that 42 additional enlisted men (men not yet at Los Alamos) be provided.

Tyler specified that Trinity would need a diesel plant and water supply operator, two general heavy-duty mechanics, two mechanics' assistants, two heavy-equipment operators, three heavy-duty truck drivers and two general-duty truck drivers, a mess sergeant, two first cooks, two second cooks, five k.p.s, five carpenters, a plumber, an electrician, a high lineman, eight general line duty men (also classified as laborers), two administrative assistants, and two medical orderlies, making 42 in all.

In late December 1944, 1st Lieutenant Howard C. Bush told the Los Alamos MPs that some of them were going on detached duty, but he could not say where. Bush had already been down to the Jornada del Muerto, as indicated in Dunlap's recollections (Dunlap had met Bush near the George McDonald Ranch about 15 December). There were either 14 or 16 men in the group detailed for this new duty (Figure 7). These were 1st Sgt. Richard O'Meara, Clerk/Cpl. William Kadow (not listed), S/Sgt. Sam Barnett, S/Sgt. Carl Dirksen, S/Sgt. Reno Moses, Cpl. Dan Shotel, Cpl. Omer Loyd, Cpl. Marvin Davis, Pfc. Richard Coleman, Cpl. Ludwig Greyshock (not listed), Pvt. Rex Harris, Pfc. Carlos Silveri, Pfc. Abel Taveres, and Pfc/Cook George Fechner. According to Davis (n.d.), the group also included S/Sgt. Wilbur Ruhlow and Tech. 4 Dillard Maher, but a memorandum of 11 January (see below) indicates that Ruhlow and Maher may have actually arrived in the second week of January.

Howard Cooper Bush was from Brooklyn. He was 35 years old in 1944. Like every other serviceman who served at Trinity Base Camp, he received a promotion of one grade, so is often referred to by informants as Captain Bush. DePaula commented on Bush's efforts to improve the camp. "Every little thing he did made it just a little bit nicer ... he was just a dandy..." (personal communication 1998). Bush was solicitous of the welfare of the men and was, consequently, well-liked. In speaking of Bush, Wilburn Dunlap never failed to use his full name, "Howard C. Bush," a sign of the respect that seemed to be shared by everyone who knew the man.

Rudolph agreed that Bush was popular. He gave an example of his attention to the men's interests: when Rudolph prepared promotions for all the engineers, but skipped a man who was hospitalized, Bush took exception and ordered Rudolph to promote the absent man with the others. On this occasion, Rudolph received his one-grade promotion from Tech 3 to Tech 2 (Tech Sgt.).

The MPs proceeded to Sandia Base in Albuquerque, where they picked up some vehicles, including a refrigerator truck and two semi-trailers for the horses. They loaded the trucks on 29 December and left on 30 December. While they ate a K-ration lunch on the side of the road south of Belen, Bush told them they were going to the Alamogordo Bombing Range, where they would see some strange structures. He informed them that they were not to talk or write about anything they saw there. They drove on south through Socorro to San Antonio, crossing the Rio Grande and heading east, then south, arriving at Trinity Base Camp on the evening of 30 December 1944 (Davis n.d.).

RESTRICTED

ARMY SERVICE FORCES
United States Engineer Office
PO Box 1539
Santa Fe, New Mexico 20 December 1944

SPECIAL ORDER)
:
NO 177)

1. The following EM, 4117th Unit, 8th SvC Dets, this sta, TP Albuquerque, N M and vicinity by Govt vehicle o/a 30 Dec 44 for TDY of not to exceed sixty (60) days and upon completion of this TDY will return to their perm sta in Santa Fe, N M:

Sgt	Richard E. O'Meara	31274222
Sgt	Sam H. Barnett	38410041
Sgt	Carl L. Dirksen	37543845
Sgt	Reno T. Moses	14030166
Cpl	Omer (NMI) Loyd, Jr	35142070
Cpl	Daniel (NMI) Shotel	33054444
Cpl	Marvin R. Davis	36439864
Pfc	Richard C. Coleman	33527001
Pfc	Carlo L. Silveri	32681001
Pfc	Abel E. Tavares	39840748
Pfc	George E. Fechner	39040548
Pvt	Alva R. Harris	39908177

In accordance with AR 35-4520, PD will pay in advance the prescribed monetary allowance in lieu of rations a/r one dollar ($1.00) per meal for ninety (90) meals to twelve (12) persons ea, and qrs a/r two dollars ($2.00) per day for thirty (30) days to twelve (12) persons ea, and will pay balance of monetary allowance to EM on completion of TDY a/r one dollar and eighty cents ($1.80) per day for subsistence and one dollar and twenty-five cents ($1.25) per day for qrs. TDN 212/50425 501-3 P432-02. AUTH: Cir Ltr 3355, OCE, 7 Oct 44.

BY ORDER OF COLONEL TYLER:

N. E. DAVIS,
Major, Corps of Engineers,
Adjutant.

OFFICIAL:

N. E. DAVIS,
Major, Corps of Engineers,
Adjutant.

EM named in par 1 above last rationed to include breakfast 30 Dec 44; will leave sta 0800 30 Dec 44; mode of travel, highway; monetary allowance in lieu of rations and/or qrs pd in advance.

N. E. DAVIS,
Major, Corps of Engineers,
Adjutant.

RESTRICTED

THE FIRST 12 OF US TO
GET TO TRINITY
DEC. 30, 1944
WITH LT. BUSH M.D.

Figure 7. Special Order sending the first 12 MPs to Trinity Base Camp. This page from the Marvin R. Davis Collection was footnoted by Marvin R. Davis. *Courtesy U.S. Army, White Sands Missile Range Public Affairs Office.*

Driving into the Bombing Range, they could see four guard towers. Davis recalls that these were 100 ft high; but Wilburn Dunlap (personal communication 1999) states that they were wooden structures, about 25 ft high, with railed observation platforms.

Davis (1995) thought that the barracks might be World War I vintage. Their paint had been scoured away by wind and sand, and the MPs could barely see through the sandblasted window panes.

There was only one man in the camp when they arrived. Davis never learned his name or affiliation, but thought he might have been from the Engineer Office in Albuquerque. Dunlap (personal communication 1999) thought that this may have been Joe B. Sanders. He showed the MPs how to run the generators. Because there were no cooks, they had to unpack food and do their own cooking. They slept on mattresses on the floor—there were no beds yet.

Davis mentioned that George Fechner acted as a cook for this first group of MPs. Fechner had been a civilian cook. He made soups for the MPs, simmering beef bones and vegetables for days to produce the stock. He also had a bottle handy at all times, according to Davis.

Thirty or more MPs arrived in January 1945. The MP detachment may have been composed of about 50 men in all, with three guard patrols of 16 or 18 members each (see notes on Camp Building 20A below).

A stable crew arrived at the camp around 11 January 1945. According to an Army Service Forces memorandum dated 9 January (Figure 8), the crew included Staff Sgt. Wilbur H. Ruhlow, Tech. 4 Dillard D. Maher, and Tech. 5 Angelo J. DiBello. Davis stated that Ruhlow was the stable sergeant, Maher a blacksmith and farrier, and DiBello a saddler.

Fourteen special engineers of the 4817th Service Command Unit, 8th Service Command Detachment, were sent to Trinity Base Camp from Los Alamos around 14 February 1945 (Figure 9). These were Tech. Sgt. John E. Daley, Tech. 3 David P. Rudolph, Tech. 4 Lester A. Wilhite, Cpl. Herbert Heintz, Cpl. Theodore M. Montgomery, Tech. 5 Robert W. Kinney, Pfc. Herman Cronenberg, Pfc. Donald C. Raub, Pfc. John P. Snyder, Pvt Edward R. Beckendorf, Pvt. Floyd B. Borden, Pvt. Stanley W. Glode, Pvt. Frank A. Manley, and Pvt. Robert W. Spry.

According to Rudolph (personal communication 1999), only he and Montgomery came from Chicago to Los Alamos. This group of special engineers included the heavy-equipment operators (Sigler and Wilhite were two of these), who subsequently bladed and maintained the system of roads required for the Trinity test, and the cooks (Kinney and Glode were the chief cooks, serving on alternate days). After their arrival, the MPs no longer had to cook their own meals. Rudolph states that this group also included a Pvt. Peter Gibbons.

RESTRICTED

ARMY SERVICE FORCES
United States Engineer Office
PO Box 1539
Santa Fe, New Mexico 9 January 1945

SPECIAL ORDERS
NO 5

EXTRACT

* * *

2. The following EM, 4817th Unit, 8th SvC Dets, this sta TP Albuquerque, N M and vicinity by Govt vehicle o/a 11 Jan 45 for TDY of not to exceed thirty (60) days and upon completion of this TDY will return to their perm sta in Santa Fe, N M:

S/Sgt	Wilbur F. Ruhlow	36010936
Tec 4	Dillard D. Maher	35747287
Tec 5	Angelo J. DiBello	32605260

In accordance with AR 35-4320, FD will pay in advance the prescribed monetary allowance in lieu of rations a/r one dollar ($1.00) per meal for ninety (90) meals to three (3) persons ea, and qrs a/r two dollars ($2.00) per day for thirty (30) days to three (3) persons ea, and will pay balance of monetary allowance to EM upon completion of TDY a/r one dollar and eighty cents ($1.80) per day for subsistence and one dollar and twenty-five cents ($1.25) per day for qrs. TD 212/50425 501-3 P432-02. AUTH: Cir Ltr 335 OCS, 7 Oct 44.

* * *

BY ORDER OF COLONEL TYLER:

N. E. DAVIS,
Major, Corps of Engineers,
Adjutant.

OFFICIAL:

N. E. DAVIS,
Major, Corps of Engineers,
Adjutant.

EM named in par 2 above last rationed to include breakfast 11 Jan 45; will leave sta 0800 11 Jan 45; mode of travel, highway; monetary allowance in lieu of rations and/or qrs pd in advance.

N. E. DAVIS,
Major, Corps of Engineers,
Adjutant.

STABLE CREW CAME JAN 11, 1945

RUHLOW STABLE SGT.

MAHER - BLACKSMITH
HORSE-SHOER

DI BELLO SADLER

RESTRICTED

Figure 8. Special order for the stable crew of Trinity Base Camp from the Marvin R. Davis Collection of Howard C. Bush papers. The page was footnoted by Marvin R. Davis. *Courtesy U.S. Army, White Sands Missile Range Public Affairs Office.*

RESTRICTED

ARMY SERVICE FORCES
United States Engineer Office
PO Box 1539
Santa Fe, New Mexico 14 February 1945

SPECIAL ORDERS
NO 26

1. Following EM, Engr Det, 4817th SCU, 8th SCD, this sta are placed on TDY of a classified nature this date. TO this sta will furn one meal ticket to the EM. TDN 210/50141 508-2401 P110-02. AUTH: Cir Ltr 3355, OCE, 7 Oct 44.

T/Sgt John E. Daley 6662159
Tec 3 David P. Rudolph 36688770
Tec 4 Lester A. Wilhite 37727193
Cpl Herbert Heintz 32702697
Cpl Theodore M. Montgomery 37380451
Tec 5 Robert W. Kinney 36265627
Pfc Herman Cronenberg 32407461
Pfc Donald C. Raub 36026197
Pfc John P. Snyder 32266438
Pvt Edward R. Beckendorf 38672332
Pvt Floyd B. Borden 42065654
Pvt Stanley W. Glode 42166352
Pvt Frank A. Manley 42187622
Pvt Robert W. Spry 36972310

BY ORDER OF COLONEL TYLER:

N. E. DAVIS,
Major, Corps of Engineers,
Adjutant.

OFFICIAL:

Davis

N. E. DAVIS,
Major, Corps of Engineers,
Adjutant.

SOME OF THE FIRST ENGINEERS TO COME SOME ARE THE MESS HALL CREW FEB. 14, 1945

Figure 9. Special order sending engineers to Trinity Base Camp from the Marvin R. Davis Collection of Howard C. Bush papers. The page was footnoted by Marvin R. Davis. *Courtesy U.S. Army, White Sands Missile Range Public Affairs Office.*

Davis recalled that some servicemen from Fort Custer, Michigan, were also routed through Camp Wolters, Texas, to Los Alamos and on to Trinity Base Camp. Rudolph (David P. Rudolph in West Virginia, telephone interview by Thomas Merlan, 17 and 21 November 1998 and 4 December 1998) remembered that there were engineers already in camp when he arrived, and that some arrived after he did, typically in small groups. Davis believed that there were 80 or more engineers. Rudolph, however, stated (personal communication 1999) that there were 35 to 40 engineers. Because Rudolph was the clerk of the Engineer Detachment, he is more likely to be correct. DePaula (personal communication 1998) estimated that there were about 40 engineers, and not more than 45. Work orders for the engineers came to Lt. Bush, who passed them through Rudolph to the servicemen.

Rudolph (personal communication 1999, Rudolph n.d.:12) stated that his unit at Trinity Base Camp was designated a Special Services Detachment and that it was detached from the SED at Los Alamos. This unit consisted of about 40 craftsman specialists, including cat-skinners, high linemen, carpenters, plumbers, and helpers for all of these specialists. These men were recruited from all parts of the Army. "Some of the rougher types *chose* this assignment instead of the brig," Rudolph commented. Rudolph added (personal communication 1999) that he would characterize only a few—three or four—of the group as men who might have had brushes with military discipline, and that Private Bert C. ("Butch") Sigler could have been one of these. DePaula thought Sigler was from Pennsylvania. He had been a boxer. DePaula remembered that Sigler told him that he had one professional fight for which he earned $1,000.

Both the MPs and the engineers (an inclusive term for servicemen who performed all sorts of construction and maintenance tasks) were under the command of Lt. Bush. Figures 10–20 are posed photographs and candid views of the MPs and engineers.

According to Rudolph, Capt. Samuel Davalos, although superior in rank to Bush, was not in the same chain of command. All the servicemen were members of the Corps of Engineers, as indicated by their special orders. Rudolph was Davalos's aide and was in nominal charge of the Engineer Detachment (Rudolph, personal communication 1999; n.d.:12), but he acted under the command of Lt. Bush. Rudolph was the Detachment's clerk, and prepared all of the records. After the atomic test, he wrote a letter of commendation to each member of the Detachment, including himself.

DePaula stated that when he arrived at the camp in February 1945, all the military police and most of the engineers were already in residence. He speculated that the camp was at about 75 percent of full strength when he arrived.

Figure 10. MPs and Special Engineers. Back row, l-r: Smith, Snodgrass, Jeffery, Agnew, Glode, Stockton, Lernor, Spry, Kymer, Levy, Gibson, Howard C. Bush. Middle row: Sisson, Davis, Coleman, Ferguson, Dirksen, Bourg, Bisher, Maher, Wendelin. Front row: Ballard, Kadow, Loyd, Greyshock and dog, Wheeler, Bresnahan, Rudder and Toff McButin, Harrison and dog, Wilhite. *Courtesy Marvin R. Davis.*

Figure 11. Pfc. Alexander Alukonis at checkpoint. *Courtesy U.S. Army, White Sands Missile Range Public Affairs Office.*

Figure 12. Carl Rudder, in charge of what he called the "East Jesus and Socorro Light and Water Co." *Courtesy U.S. Army, White Sands Missile Range Public Affairs Office.*

Figure 13. Second guard patrol (MPs). Front row, l-r: Carl Dirksen, Don Smith, Andrew Wendelin, William Sisson, Dillard Mayer, Lester Buchman, Richard Coleman, Captain Howard C. Bush. Back row: Scott Ballard, William Kadow, Carlo Silveri, (?) Levy, Rudolph Tucka, Ludwig Greyshock. *Courtesy Marvin R. Davis.*

Figure 14. Engineers. Standing, l-r: Cox, Brooks, Matthews, Borden, Zigler, Lane, Taylor, Bourg, Cothern, Palmer, Rudder, Downing, Manning, Gocheck, Harrison, Johnson. Kneeling: Lerner, Bresnahan, Gibbons, Hanley, Levy, Raub, Snyder, Rudolph, Daley, Martin, Hall, Yowell, Glode, Stockton, Howard, King. Sitting: Kinney, Wilhite, Kymer, DePaula, Cronenberg, LaPerle, Gibson, Manley, Rosenthal, Spry, Fries, Baker. *Courtesy Marvin R. Davis.*

Figure 15. Camp engineers in front of their office (from Carl Rudder's scrap book). First row, l-r: Kilmer, Frenchie (Pvt. Keith F. France?), Bontley (?), Leary, Spry, Raub, Kemp, Stockton, Rudolph. Back row: Borden, Cox, Harrison, King, Bresnahan (?), Sigler, Matthews, "Weadle-Waive" (?) and Capt. Gueary (?). (Note that a few of these names have not been verified.) *Courtesy U.S. Army, White Sands Missile Range Public Affairs Office.*

Figure 16. Lieutenant Howard C. Bush on his mare "Honesty." *Courtesy Marvin R. Davis.*

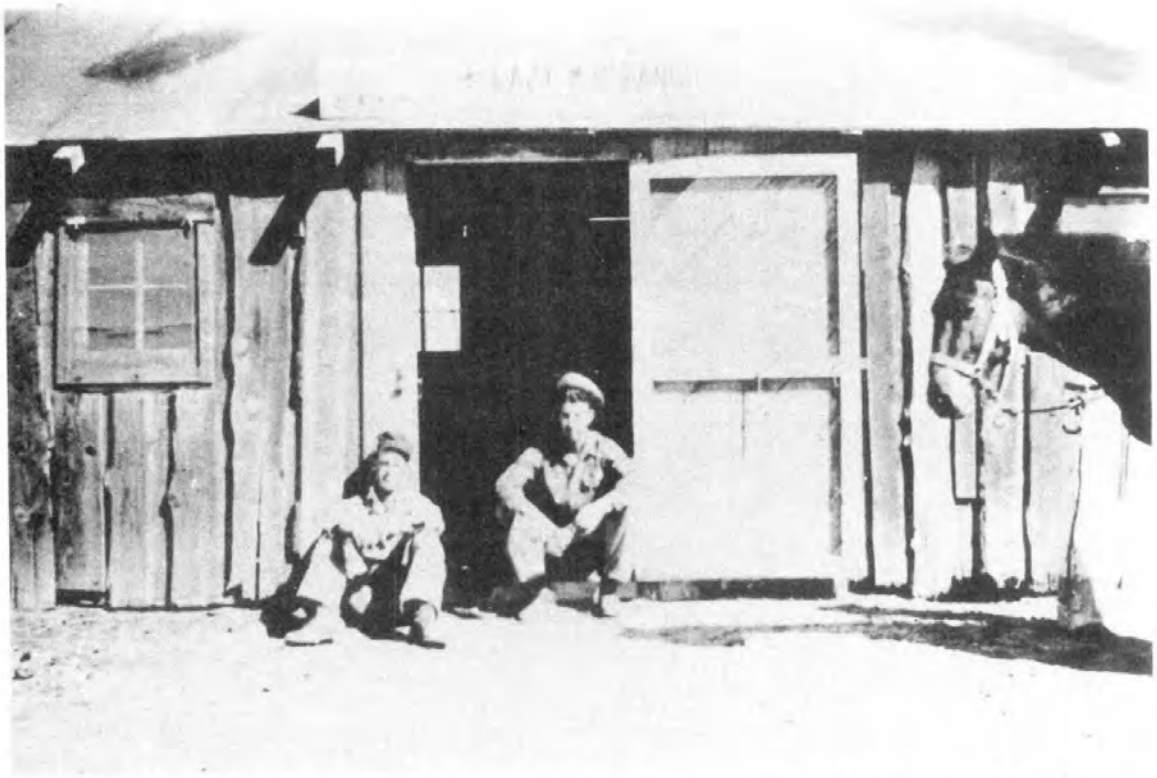

Figure 17. Harold "Smitty" Smith, Special Engineer Detachment truck driver from Massachusetts, and Ferd Bisher from Missouri, at the Lazy MP Ranch. *Courtesy Roy C. DeHart.*

Figure 18. Sergeant Richard O'Meara at Base Camp on 16 July 1945. *Courtesy Mrs. Richard O'Meara.*

Figure 19. Sergeant Richard O'Meara at the Santa Fe Fiesta, 1944. *Courtesy Mrs. Richard O'Meara.*

Figure 20. Sergeant Richard O'Meara on patrol at Trinity. *Courtesy Mrs. Richard O'Meara.*

Continuing Construction

Capt. Davalos was in transit most of the time, collecting supplies and materials; he was rarely at Trinity Base Camp (Rudolph, personal communication 1998). On one occasion when he was in camp, he and Rudolph went to Ground Zero to accept the Blaw-Knox tower on which the atom bomb was to be detonated (Historic American Engineering Record No. NM-1A n.d.). Rudolph states (personal communication 1999) that the tower was erected by the Eichlay Company of Indiana.

John H. Williams, leader of the Electrostatic Generator Group at the Los Alamos Scientific Laboratory, took charge of the construction of Trinity Site in the Spring of 1945. This meant oversight of the construction of the Trinity experiments (that is, the group of experiments devised to measure the test), as well as additional construction and servicing of Trinity Base Camp (Los Alamos Scientific Laboratory 1986:37). Williams was a high-energy physicist and, like many others, he found himself in charge of operations that had nothing to do with his normal duties.

"...Bainbridge...seemed...rather disorganized," Emilio Segré (1993:201) writes:

> He often changed schedules, and he posted his all-important daily orders in various places, so that we did not know where to find them. He ended by placing them in the lavatories, saying that everybody would see them there. Fortunately, Oppenheimer must have sensed the problem and gave Bainbridge as second in command J.H. Williams, who was excellently suited to handle a situation requiring the laying of many miles of cables, building roads and shelters and other civil engineering jobs. Bainbridge and Williams had to coordinate a very complicated operation subject to a tight schedule, involving laborers, military personnel, contractors, truck drivers, and prima donna physicists.

Wilburn Dunlap was a civilian engineer who joined the Army Corps of Engineers in December 1941, surveying what became Walker Air Force Base. A travel order issued by R.E. Cole, District Engineer of the Albuquerque District, U.S. Engineer Office, and dated 21 November 1944, orders Dunlap to proceed from Roswell to Alamogordo "on duty connected with flood control work." Dunlap told the story of how he proceeded to Trinity to survey structures, communications lines, and experiments:

> On the twelfth fourteen 1944, the project engineer at the base [Earl Garrett] ...called me in and he had a little piece of paper about the size of a cigarette paper, and he handed it to me. On that it had a longitude and latitude. ...he says, you know what I did? I says yes, because we was trying to lay it out here, been trying to lay the point out here and got dirt piled here at Walker. ...Garrett give me longitude 106 [degrees] 52 [minutes] north and 9 seconds, and the latitude is 34 [degrees] 19 [minutes] north. He says can you go there? I says, I sure can. He says, I'm glad you can, I couldn't. And he told me to go to the meeting point. It was [Lieutenant] Howard C. Bush, and the meeting point was five east ten south. ...Well, we had a little trouble gettin' out there. You see, it was so secret I couldn't even tell the wife where I went. I just disappeared. ...So our first trip over there, not knowin' what to expect; I knowed the whole country was under MPs all right, but we made a mistake stoppin' in...Carrizozo—went to purchase supplies. We didn't know

how long we was goin' to be in there see, and get our vehicle serviced. ...when we come out there was these two MPs in a carryall, Army carryall, and had the hood [of Dunlap's truck] up and had their heads under there...I went out there, and they just kept on, they ignored us. I says, you don't get your heads out from under there I'm gonna shut that on you. So they backed up, and says, we demand your travel orders. I says this pickup's assigned to me, I'm responsible for it. They demanded our travel orders, where we was goin' and what our business was. Well, we couldn't tell 'em that, see....I slammed that hood and just got in the pickup and started drivin' off. They pulled their forty-fives. I says what you goin' to do, try to beat us to death with that? 'Cause they didn't have no shells, I knowed they didn't carry no shells. So we was takin' off and they followed us. We went over there in that Jornada del Muerto, and a lot of dry ravines over there, and we left the highway....Oscura, that's right, and we turned west there. Well, that's a dirt road, so I knowed when we got to there (we'd been there before when we took the targets out)...we lost 'em. We raised so much dust after one or two dry ravines...some of them's 10, 12 foot deep...we stuck in one of them...got on top of the pickup and skylined the area, the whole area, and finally just got up and left. Then we went on to meet...Howard C. Bush at five south, ten east.

[*TM: had you been told exactly why you were meeting him, or had you simply been told to go meet him?*]

You wouldn't know nothing. What you was told, keep your mouth shut...that's the only way you get in there. So we met him. We's supposed to be there at five south, ten east [note that this reverses the order given earlier. Township 10 South, Range 5 East is probably what he means.] at five o'clock. Well, we made it all right. We was there about fifteen minutes before. But, we didn't dare to get out of the ravine until we knowed the MPs was gone, because they was goin' to take us in to their headquarters—they told us they was goin to take us in if we didn't produce travel orders. So we got over there, and the password was 'Bill Jack.' My nickname was Bill, and the other fellow's was Jack—A.L. Mace is his name. We got there and as he walked up to us, I says 'Bill Jack' and he says 'Bush.' So that didn't mean nothing to nobody else, but that was assurance that we was the right party. And he takes us on in to, at that time engineer's headquarters—is McDonald ranch house to the public. There was no such thing as McDonald ranch house. [TM: This ranch house?, indicating picture of the house where the atomic bomb was assembled.] That's it. [TM: Which is about two miles from Ground Zero?] Yeah. Well, we met with the project engineer and went over there—Sanders [Joe B. Sanders]—and they fixed us on what they needed. Then we had to go to the contractor....You understand the engineers went in there first—like we went out here and laid a grid out, and sent that in to Albuquerque, which is—Colonel Cole was over four states, the four corners states. So we sent that in there so they could start planning this out...of course, it was planned off the grid set. Everything was off the grid set so there wouldn't be no duplication of locations. [We didn't know where?] we was going over there because we did the topography—104 degrees 31 minutes and 20 [seconds] west of Greenwich, and the longitude and latitude was 33 18 20....

[*TM: What did Lieutenant Bush ask you to do?*]

He didn't ask us to do nothing. He's the CO of the militaries.

[TM: What did Joe Sanders ask you to do?]

> Well, he told us what the layout was to be, the communications lines, some buildings and some bypasses. ...we went in there several times. ...one time we staked out the platform where they put the hundred tons of TNT.
>
> (Wilburn T. Dunlap, personal communication 1999)

Dunlap indicates that MPs were detailed to assist him in laying out communications lines and experiments. "...we got the same sergeant we had before, and he said, well, he had two new ones; now I couldn't get those others, they were on guard duty..." (personal communication 1999).

Official restrictions on information complicated the task of laying out the communications lines and siting bunkers, as Dunlap (personal communication 1999) explains.

> They had three officers, uniformed officers there, with a big map and a rolled-up plan in a steel tube. Well, they called me on one side and says 'This is what I want, this is what I want, this is what I want,' page, after page, after page. I just went and set down. I says 'I don't have a [?] line; if you want me to lay this out, these radiis, I have to have somethin'. So they went over and...they taken a knife, and they would cut out...you got some plans there...they cut out some...one particular and hand it to me. I do that. They take it, put it back in there, roll it up. Then when I got to do it, they cut out another one. This went on and on and on. We should have been able to do that...quite a bit less than a day, and it taken us...before sunup to about dark, because it was such a drawn-out procedure. They wouldn't let me have the plans to do it, and I's layin' out these radiis to put the bunkers out here...

Dunlap laid out "X point" for the 100-ton test (that is, the non-atomic test that took place on 7 May 1945) exactly one mile from Ground Zero. "We chained it with a standardized tape and a thermometer. Then I triangled it off a baseline. . .I triangled that. . .to be sure that we were right. . .we were doing some more communications lines, figurin' it out, and a C-47 landed in there [at] Ground Zero..." (Dunlap, personal communication 1999). The purpose of measuring exactly a mile was to provide a basis for calibration of instruments for the atomic test.

A memorandum dated 17 May 1945 to Groves from Colonel G. R. Tyler, the Army Corps commander in Santa Fe, asks that the District Engineer in Albuquerque be given a revised construction directive to authorize additional technical buildings, roads, pole lines, and camp buildings. This memo notes that the total cost of all construction, engineering, and service through 30 April 1945 (except the transportation of Jumbo to the site) was $146,844,41. The additional construction was expected to cost approximately $100,000 (this additional construction included the buildings labeled A, B, C, and D, as well as pole lines and roads).

Wilburn Dunlap tried to lay out the 9-mi-long communications lines and was frustrated by heat waves, brush fires, and accidents. He came up with the idea of using

mirrors and sun lines to triangulate locations. Project Engineer Joe B. Sanders was with him and A. L. Mace when

> I went out with him one night to do that and he put his big foot between the pole and the triangulation point and knocked the transit over...I told him we'd do it the next day...We taken the mirrors off the latrine. There's guys in there shavin' and they's a-raisin Cain with us. We had that big sergeant with us...and the next day I went over to the latrine, was gettin the mirrors off the wall. Some of the GIs come in to shave...'What you doin?' 'Well, we need these'...they had this sergeant and he's a big son. He says, 'We need these, we'll bring em back when we get through.' So we got those mirrors off of over the sinks there and used 'em the next day to use the sun to triangulate that in. We went the whole day and got it all done and didn't miss 'em. But we had signals with the mirrors off the vehicles, and let em know when we were through and then they'd move. They didn't move 'till we give the signal...they had two mirrors, and they used the sun, and they would...the nearest point was nine three and quarters miles...They used the—if the sun was...over here and we went that way, it was—so I'd end it here...on that point, so I could pick it up...turn that angle...at least four at every angle...to make sure they wouldn't make no mistake, and it come out perfect...
>
> I had my crew. I had Jack [Mace] and seven GIs that day, because they had to—some of the places they got to shinny up those poles...you know how you fix a thing to walk up a pole with on your foot—walk up those poles... We knew where the locations was, we knowed about what to expect. ...so Jack went...I stayed. I kept one man with me to drive... We was here. Jack would go to this one, the next space, and then set the sergeant and his two men there with the mirror... and he'd go to this point here... So that would get this interior angle, and when they'd give the signal that they'd got the angle, I'd move here. ...Jack would come to the sergeant's place, the sergeant would come to Jack's place. The sergeant's here; he didn't know the country. The sergeant would come to here, and to where I could get this angle in here, see. He'd come to here and Jack would go back to this, see. And the whole country over there, we triangulated. The closest is nine and three-quarter miles [speaking of a communications line]... We take and put 'em back [the mirrors] right where—late that night so they'd have 'em the next morning—they was kind of put out when they didn't have no mirrors to shave by... (Dunlap, personal communication 1999)

General Groves's office diary shows that road paving at Trinity began around the first part of June, and took a month or more (Record Group 77, Groves diary entries for 26 and 27 May 1945).

Scientists and technicians began arriving at Trinity Base Camp around March 1945, and subsequently came and went until after the Trinity shot in July. Davis estimated that the maximum population in the camp was 200 to 250 people. If, however, we accept that there were 40 engineers and no fewer than 50 military police, and we add approximately 200–250 technicians and scientists who were there just prior to the atomic test (Los Alamos Scientific Laboratory 1986:46), the camp may have had a

maximum population of about 300 inhabitants. Fitzpatrick (1946:35) estimates a peak population of 300.

Jumbo

In June 1944, the project scientists requested the construction of a steel vessel, designated "Jumbo," to serve as a container for the first atomic device. Oppenheimer specified that it was to be 25 ft long and 12 ft in diameter, with walls 24 in. thick. It would weigh 214 tons. At the time, plutonium was extremely rare and difficult to produce. It was thought that if the 5,300 pounds of high-explosive lenses surrounding the core exploded, but no nuclear reaction took place, the plutonium might be recovered if contained in the vessel. Oppenheimer told Groves, however, that the explosion would most likely shatter the container. There was a long delay in building it—several manufacturers, including Bethlehem Steel, reviewed the specifications and refused the task. Eventually, the Babcock and Wilcox Corporation of Barberton, Ohio, accepted the job in August 1944.

In early April 1945, Jumbo was completed and moved by special railroad car to the siding at Pope. Then it was loaded on a trailer pulled by two tractors and hauled 25 miles to the test site (Figures 21 and 22). Jumbo was finally located at a point 800 yd northwest of Ground Zero on 4 June 1945 (Figure 23). Farrell called Groves in Washington to let him know that Jumbo had arrived. The steel container was never used—by the time it arrived, the scientists had decided that it would not be needed. Plutonium production at Hanford and Oak Ridge was now increasing rapidly, and preventing the loss of material was no longer a major consideration. Still, Bainbridge mentioned Jumbo in a 11 June memo to Norris Bradbury, saying that "we must continue preparations for its use until Oppenheimer says to forget it for the first shot" (Groueff 1967:342).

Water

The ranch headquarters well (No. 10) was about 150-175 ft deep and produced about 15 to 20 gallons a minute. It was assumed, at first, that this would serve for sanitary uses. The water would be pumped into the existing 10,000-gal. storage tank to create adequate pressure (Davalos 1944). The 10 October 1944 memo also states, however, that this water was too alkaline for drinking and, accordingly, it would be necessary to employ a tank truck with a capacity of 700 gal.

In his file memorandum of 7 December 1944, Davalos noted that he had hired a plumbing contractor to rehabilitate the pump in the existing well (No. 10) to provide sanitary water. He also noted that "tentative arrangements have been made to procure drinking water from the town of Socorro."

Figure 21. Orris M. Jeffery sitting on the 64-wheel trailer that hauled Jumbo, with Jumbo in the background. *Courtesy Roy C. DeHart.*

Figure 22. Scoop shovel used for hauling unloaded Jumbo carrier. The 2-ton trucks in the rear were for braking. *Courtesy Marvin Davis.*

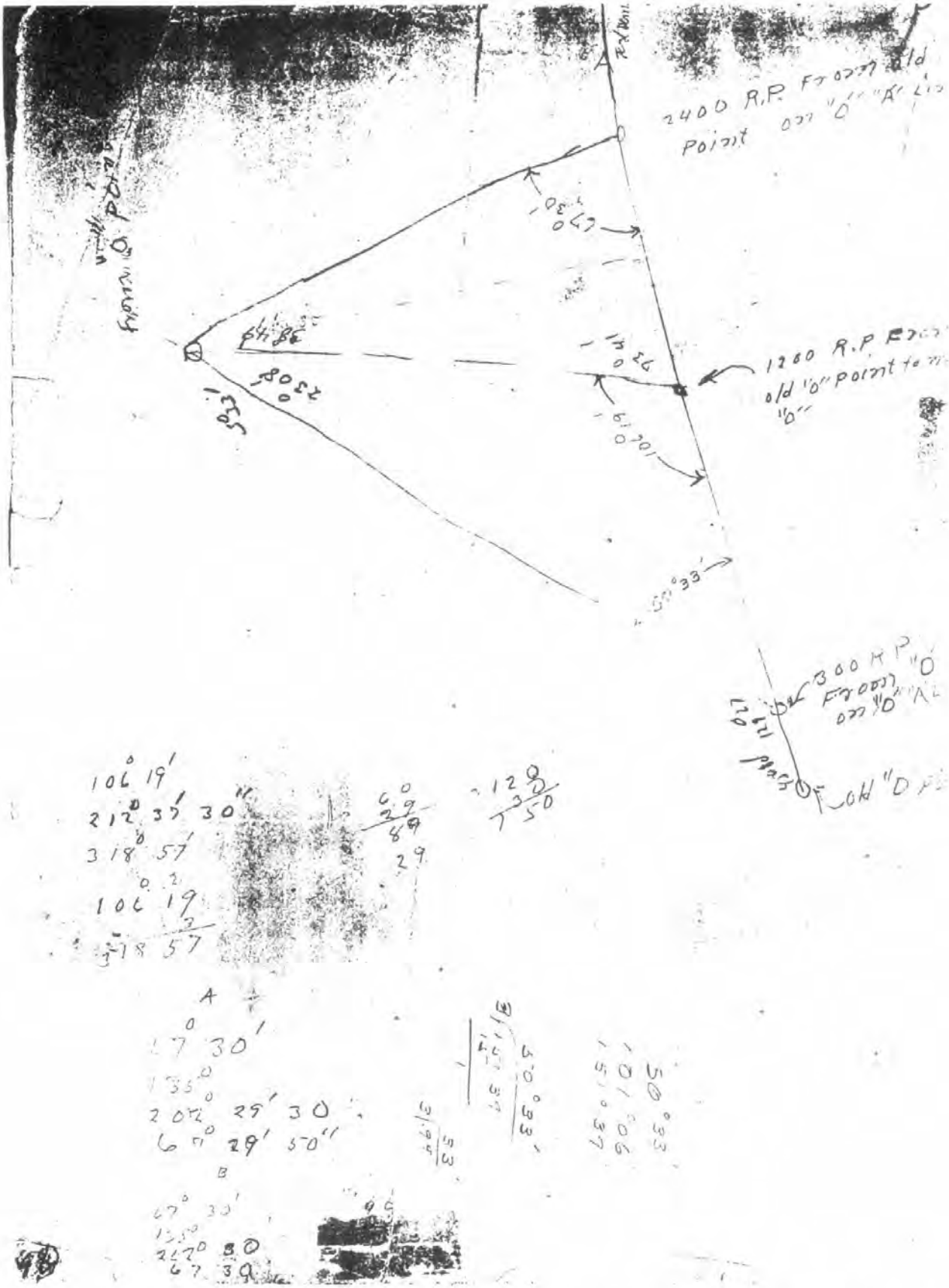

Figure 23. Triangulation made for the purpose of siting Jumbo. Wilburn Dunlap calculated this triangulation from Ground Zero along the base line to the site of the 7 May test. The apex of the triangle (upper left circle at 5°33′) is the location of Jumbo. *Courtesy Wilburn T. Dunlap.*

MPs and engineers put new casings and a new bottom valve in Well 10, using a 1-ton truck with a winch to pull the rods and casings. The well did not improve noticeably. "To shower, we had to use salt-water soap. Regular soap did not make suds at all and if you washed your hair with it, the soap congealed like grease and was hard to remove" (Davis n.d.). There were cold showers only.

K. T. Bainbridge, Sam Davalos, Major Stevens, and J. H. Williams met on 8 March 1945, to discuss the water situation. They decided that the existing ranch well (No. 10) was inadequate to meet the needs of the camp. They decided to clean out a second well (No. 9) located 75 ft away and to drill more wells if needed. The memorandum of this meeting (Record Group 434) indicates that the drinking-water truck had not arrived. The meeting also resulted in an agreement to use the existing ranch buildings (Nos. 13 and 16) as "laboratory or office space for the technical personnel."

Sometime in late March (after 16 March 1945 memo from Colonel G. R. Tyler authorizing the work), the second ranch well was cleaned and rehabilitated to provide additional sanitary water. The water truck also arrived about this time.

Davis stated that military police drove the water truck to and from Socorro until the engineers arrived (He may be mistaken about the dates, however. The engineers were in camp by 16 February, as indicated above, and the water truck did not show up until sometime in March.). DePaula said that the water truck was driven by Bert ("Butch") Sigler, the ex-fighter. When asked, he told civilians that he was "working with the bombing range." Often, Tech. 5 Robert W. Kinney would volunteer to drive the water truck on his day off, and Rudolph would assign him to the duty (Rudolph, personal communication 1999). On every trip for water, he also brought back a gallon of whiskey.

Sometime in the Spring of 1945, a new well was drilled by a contract crew. This well was about 400 ft deep (Davis, personal communication 1998). Since there are only two known wells on the site, and given the notation of 8 March 1945 that the second ranch well is 75 ft from the first, it appears that the contract crew deepened the second ranch well.

All water from both wells was, at first, used only for sanitation. Water-softening equipment was installed sometime during the Spring of 1945, but the unit was too small to handle the high concentrations of gypsum and lime (Los Alamos Scientific Laboratory 1986:39). Rudolph (n.d.:13) states that the water-softening equipment and an air-express shipment of Zeolite had minimal effect on the water. "It turned out that the powers that be, concerned about anything that might reveal the location of the site, refused to give the supplier a sample of our water" (Rudolph n.d.:13).

Harold Smith was sent to pick up a windmill on a ranch near Trinity (Harold H. Smith, personal communication 1999). Perhaps the second well had no mill, or had a mill that was too small to raise water from that depth.

Rudolph (personal communication 1998) added that a second shipment of water-softening equipment arrived after three or four weeks, and that once it was installed, the water from the two wells was adequate for drinking and washing. The water trucks were not used after that. This second installation was completed about mid-June 1945, just in time for the influx of scientists and technicians from Los Alamos.

Ranch cattle wandered in the vicinity and were driven off when they came to water at dirt tanks in the test area. The MPs went around to all the nearby stock wells and shut them off to discourage the abandoned cattle on the range from coming to water, "but it was a hopeless task" (Davis n.d.). Davis remembered a herd of ranch horses near the base camp, as well as a number of burros branded with a "61."

There was no place to swim at Trinity Base Camp. The concrete stock tank at the George McDonald headquarters (where the bomb was assembled) was used as a swimming hole by the scientists and technicians, as well as by MPs and engineers. Davis remembered swimming there. "We got a pump going and filled one of the reservoirs at the McDonald Ranch and used it as a swimming pool. The only trouble was that the alkali in the water dried in white spots on your body and made you itch all over" (Davis n.d.). He doubted that any dirt tanks were used for swimming.

Heating

One of DePaula's tasks was to pick up coal from a point immediately northeast of the camp and distribute it for use in stoves and boilers. He remembered depositing coal on the east side of the Post Exchange (No. 22). As far as he could remember, he simply dropped a quantity of coal on the ground. Motor fuel was delivered from a Socorro gas station in a tank truck. The regular driver was a woman (Rudolph, personal communication 1998, Rudolph n.d.:13), who became "the only source of romantic bragging by some of the senior MP noncoms."

As of 8 March 1945, the camp was using coal stoves. At their meeting on that date, Bainbridge, Davalos, Stevens, and Williams agreed to bring in about six oil stoves.

General Conditions

Bush and his men had brought their horses, but soon saw that they would never be able to patrol such a large area effectively with them. They switched to jeeps and

trucks. The horses were used mostly for the games of polo that were Bush's favorite pastime, although a single horse may have been used at times for the shorter patrols.

Harris remembers that the MPs patrolled in pairs, but stood guard at the towers individually (personal communication 1999). A patrol lasted six hours, after which the guards went off duty for another six.

The men were also on guard against rattlesnakes, scorpions, and tarantulas—black tarantulas 6 in. across, standing two or three inches tall, Davis remembered. Scorpions particularly liked the latrines, which were at ground level. Once, while K. T. Bainbridge and Ben Benjamin were standing close to a deep mine shaft that Benjamin had found and Bainbridge wanted to see, they looked down to find a large rattlesnake between them (Figure 24). Luckily, this was early in the morning and the snake was still cold (Benjamin, personal communication 1999). In the barracks, the men learned to shake their clothes out carefully every morning, to be sure that scorpions and snakes had not invaded during the night.

Figure 24. Trinity personnel were alert to the presence of rattlesnakes. *Courtesy Benjamin C. Benjamin.*

Felix DePaula had an eight-foot pole to ward off snakes. Leaving his barracks (Camp Building 20B) one day with another engineer—like DePaula, one of the so-called "extras" who had no regular trade and did whatever work was assigned—DePaula saw a large snake (it turned out to be nonpoisonous; probably a bull snake). He put the stick

Errata Sheet for *Life at Trinity Base Camp* by Thomas Merlan

pp. 47–48. A portion of the text is missing. The paragraph beginning on p. 47 and ending on p. 48 should read as follows. The **bolded and underlined** text was inadvertently omitted.

> Felix DePaula had an eight-foot pole to ward off snakes. Leaving his barracks (Camp Building 20B) one day with another engineer—like DePaula, one of the so-called "extras" who had no regular trade and did whatever work was assigned—DePaula saw a large snake (it turned out to be nonpoisonous; probably a bull snake). He put the stick **under the snake and tossed it high in the air. DePaula and the other engineer walked to** the mess hall, where they found that a commotion had disrupted the chow line. The snake had soared over the PX and MP barracks (Camp Buildings 22 and 20A) and landed on the shoulders of a man in line. The consensus was that the snake must have been picked up by a hawk and had fallen out of its claws. DePaula and his buddy sensibly said nothing (DePaula, personal communication 2001).

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Remembering Trinity, men from milder climates talked about the harsh desert conditions:

> There was a ridge of alkali that intersected both the East-West Road and the North-South Road. When a vehicle crossed it, a cloud of white dust billowed up like talcum powder. The men riding in the vehicles to and from the guard posts were completely covered with it. It also got into your eyes, ears and mouth. It was really miserable trying to get it off with the alkaline water in the showers (Davis n.d.).

MPs at the guard posts were too far from Base Camp to come in for meals. Generators were set up at the guard posts, and most of the men cooked bacon and eggs on hot plates. Peanut butter, peach and pineapple preserves, and orange marmalade were popular.

Initially, the MPs not only guarded the site; they also had to convoy materials and supplies from Los Alamos. However, as the Special Engineers arrived, they took over this part of the work.

Rudolph (n.d.) says that all mail was routed through Los Alamos, and there was only one mail run per week. "Those few who...received mail written in Yiddish had to wait for the censors to get translation help," he notes. Mail delivery later improved with the establishment of a post office box—P.O. Box 632—in Socorro.

None of the men interviewed mentioned a chaplain at Trinity, and the documentary record does not refer to one.

At first, Los Alamos was the only source of fresh uniforms, and it might be weeks between deliveries. The MP uniforms became "decrepit" Davis writes (n.d.). Eventually, the camp personnel made arrangements to have laundry sent to a commercial laundry in Socorro. While there, beer and soda were also picked up at the Illinois Distributing Company and the Hammel Brewery Building in Socorro.

In April 1945, Bainbridge sent a memo to "all concerned," explaining that since rations were issued to Lt. Bush on Mondays, Wednesdays, and Fridays, and Bush was required to leave his list of needed supplies on a Monday, to be picked up on a Wednesday, "A minimum of four days notification is necessary if there is to be sufficient food on hand so that he can avoid the present difficulties which late-comers run into of having to eat delicatessen store meat instead of the particular roast scheduled for that day. Please cooperate..." (Los Alamos Scientific Laboratory 1986:39).

All personnel, civilian and military, washed their own mess trays and policed their own quarters (Fitzpatrick 1946:35).

The work days at Trinity Base Camp were long (Figure 25). Ten hours was regarded as normal, and 18-hour days were common. Reveille was at five o'clock, and work began by six for scientists and GIs. Lunch was at noon. The mess hall had an air conditioner, and the men had an hour to cool off when it was hot. At first, dinner at five o'clock was the end of the work day, but as the pace quickened, it became common to return to work after dinner and stay out until ten or twelve or even later. Richards (1993:75) notes that lights out was at about ten at night.

Working in darkness meant accidents—men digging holes might cut coaxial cables, or a jeep might swerve off the road and tear out the low-slung communications wires (Lamont 1965:123).

Figure 25. Ben Benjamin (foreground) and Ernest Wallis taking a break two or three days before the atomic test. Benjamin is sleeping on the lid of the cistern (No. 36). *Courtesy Benjamin C. Benjamin.*

A 24 March 1945 memorandum from Bainbridge says that the men would not be allowed to use combat suits, and that these were to be turned in. Ski pants and parkas were considered as substitutes. As Spring came, there was no more thought of extra clothing. Most of the men took to wearing GI shorts, woolen socks, shoes, and visored green fatigue caps, often going without shirts. Many wore protective goggles or bandannas. At the end of the day they were covered with alkali dust, which also penetrated the barracks and coated everything (Lamont 1965:123).

Privates were paid $50 per month. Davis recalled that the privates first class were paid $66, the corporals $75, the sergeants $100, and the staff sergeants $115 (personal communication 1998). Many of the engineers were sending "at least half" of their pay home to their families. They bought necessities like toothpaste at the Post Exchange, and might have "five or ten dollars" to gamble with each month. Rudolph noted that the nightly gambling would begin with small crap games, the winners of which would then play poker, with Robert Kinney often emerging as the heavy winner. Later, when civilian contractor crews would come down in the middle of the week, these latter would overwhelm the impoverished GIs, who resented the fact that these crews, arriving on Monday night and departing on Friday morning, would be getting hourly pay for the entire week, at rates far above Army pay.

Payday was once a month, around the first of the month. Rudolph thought that the men were paid in the mess hall. Payment was counted out in cash. One of the senior noncommissioned officers issued pay, from which allotments for dependents were deducted. The men lined up in regular Army fashion to be paid (Rudolph, personal communication 1998).

Scientists, technicians, enlisted men, and officers all mingled in the camp. There was a degree of informality, but no discussion of the test preparations. Some of the distinguished visitors played volleyball. Davis met Enrico Fermi, George Kistiakowsky, John von Neumann, and Oppenheimer (Davis had also encountered Oppenheimer at Los Alamos, where Oppenheimer and his wife rode horses for recreation.). Oppenheimer was gracious with questions about servicemen's homes and families.

Wilburn Dunlap (personal communication 1999) spoke of an invisible barrier that separated rarified scientific minds from regular folks.

> ...they taken us over to the barracks to get our bunks. The sergeant turned on the lights. I don't know how many men was in there, hundred or more, in that long barracks, and they would bunk right next to a tall, slim guy. Well [A.L. Mace, Dunlap's partner and 'instrument man'] says I can't sleep on that top bunk. I says, I'll take it, so he's takin the bottom bunk. Well, we spoke to this tall slim fella. He didn't answer, but he had a book case, bout five or six foot high, and he had it top to bottom and he had two chains around it, and he had a dog. He had three [?] pans, with black rings around em, bout this big around, water, food, and I think he had one of 'em for milk. I don't know what it was, but they had three pans there. So we spoke to him, but he ignored us...when we got up to the next morning, I got up and went off the end of the bunk...my partner, he's half asleep; he catched ahold of that book case. That dog eat him up, that dog was trained, he looked like he was half hyena. He had a big chest, long front legs and short hind legs...he got his feet, bare feet in all three of those pails, got all that squashed up, oh he got mad...This young scientist, tall, slim—he grabbed the dog and went out take him his walk. Well, time Jack [Mace] got his clothes on and everything he was so mad, he was down that sage brush and that sand and stuff walkin' his dog fore he went to chow. He says I'm goin down there and whup him. I says you go down there and that dog'll eat you up, boy...you better leave him alone. So I talked him out of that...We didn't have enough sense to talk to them scientists. They had a one-track mind, and you didn't get in that one-track mind at all. We knew 'em, knew of a bunch of 'em, but as far as talkin' to

em or shakin' hands with em or speakin' to em, no, we was too busy, we had business from sunup to sundown...

The Europeans

Emigré scientists who worked at Trinity included Otto Frisch and Victor Weisskopf from Austria; P. B. Moon, Ernest Titterton, and William G. Penney from England; Frederick Reines and H. H. Barschall from Germany; and Enrico Fermi and Emilio Segré from Italy. Some had become or were in the process of becoming American citizens; others were officially classified as enemy aliens. Many other emigrés worked on the Manhattan Project but were not at Trinity. The project could not have happened without them. Fermi, for example, probably had the most comprehensive understanding of all the scientific and technical aspects of the project, Oppenheimer not excepted.

Fermi had accepted the Nobel Prize in Stockholm in 1938, and had emigrated to the United States rather than return to Fascist Italy. He had built the first chain-reacting atomic pile at the Metallurgical Laboratory at the University of Chicago in 1942. His inexhaustible energy, the seeming infallibility that gained him the nickname "the Pope," and his kindly— some thought saintly—disposition made him a cynosure. "Most of those fellows [the Trinity scientists] seemed like anybody else to me," Robert Krohn recalled (personal communication 1996), "but Fermi wasn't like anybody else I ever met."

Segré would be Fermi's biographer, and the author of an autobiography in which he recorded a European's reactions to the American Southwest. He describes the Tularosa Basin this way:

> The New Mexico desert where we were working is not completely arid; on the contrary, there is appreciable precipitation, but the rain is concentrated in very few violent storms....It is not rare for somebody to lose his car or even drown in crossing an arroyo that only a few minutes earlier was dry....The desert vegetation, often curiously adapted to the dry climate, is primarily shrubs and cactus, with some grass and no trees. Animals escape the sun by going underground. Many are nocturnal. Rattlesnakes and other reptiles, such as gila monsters, as well as spiders, scorpions, and other unusual creatures are plentiful. (Segré 1993:198-199)

Segré also notes his impressions of Pueblo culture as he first saw it at Los Alamos:

> One of the leaders of the ritual dances was Popovi, an excellent electrician working in the laboratory on our accelerators. When there were Indian religious ceremonies, he painted his face half yellow and half green and led the dance with the utmost seriousness. He was the son of Maria Martinez, a celebrated ceramic artist....After the war, Popovi too became a famous artist, but lamentably, he died young, a victim of alcoholism. (Segré 1993:187)

Segré gives an idea of how the scientists took the camp routine:

> We physicists lived in separate barracks, identical to those of the military personnel, and we also enjoyed their excellent food. We started working intensely at daybreak. The early morning hours were the best; as the sun rose higher in the sky, the heat became oppressive, the light blinding, and we wilted. In the evening, we fell exhausted on our cots, only to start again the next sunrise. In this way we spent several days measuring the scattering by air and ground of gamma radiations emitted by a strong radioactive source simulating a bomb....I took with me a French novel by Gide... (Segré 1993:199)

Jack Aeby took a picture of Segré by the barrage balloon that carried a pair of airborne ionization-chamber detectors. It shows him rather jaunty in shorts and a Panama hat.

Vehicles

The water truck was a 2.5-ton, 700-gal. tank truck. There was one gas and oil truck, a 2.5-ton, 750-gal. vehicle, three combination stake-and-platform trucks, three dump trucks, a refrigerator semi-trailer that was stationed at No. 13 for photography, a 5-ton truck and tractor, a 1.5-ton fire truck, two "motor patrols" with 12-foot blades (possibly road graders) and snowplow attachments, and two D-7 or equal bulldozers.

According to a memorandum of 16 October 1944 (Record Group 434), the technical staff and the MPs had two 4-by-4, 1.5-ton trucks for laying phone wire; four 6-by-6, 2.5-ton trucks for transporting high explosives from the nearest railhead (evidently meaning Pope and referring to the explosives used in the 100-ton test on 7 May); nine 4-by-4, 1/2-ton panel trucks for installing instruments and for maintenance; eight 4-by-4, 1/4-ton jeeps; two 15-passenger busses (to carry passengers back and forth from the camp and Ground Zero); one ambulance; one telephone-installation and maintenance truck; one 3/4-ton truck equipped with earth bores and a pole-setter (to set poles for test gauges); nine 4-by-4, 1/2-ton carryalls (the memorandum explains that four of these are for patrols, and five are for "warning in case of super activity"); and two 3/4-ton carryalls for changing guards, relief, and supply.

There were also various passenger cars and sedans, visible in the photos. British physicist P. B. Moon had never driven a car. Robert Krohn and another man taught Moon to drive at Trinity, "because he couldn't do any harm. Take him out on the dirt roads and he couldn't do any harm. He was a terrible driver because he'd never [laughing]—here's a full-grown man, he was older than I was, he'd never driven a car in his life..." (Krohn, personal communication 1999).

Travel

Throughout the spring and summer of 1945, a constant stream of personnel traveled between Los Alamos and Trinity "in a motley assortment of busses and cars, some of them barely able to make the long, monotonous trip" (Los Alamos Scientific Laboratory 1986:37). Dana P. Mitchell, the laboratory's assistant director, issued instructions for the trip:

> Under no conditions when you are south of Albuquerque are you to disclose that you are in any way connected with Santa Fe. If you are stopped for any reason and have to give out information, state that you are employed by the Engineers of Albuquerque. Under no circumstances are telephone calls or stops for gasoline to be made between Albuquerque and your destination. (Los Alamos Scientific Laboratory 1986:37)

All personnel were required to sleep and eat at Trinity Base Camp rather than in any nearby town. There were no recreational trips to town for dinner or movies. Some of the engineers and MPs accompanied the water truck and supply trucks to San Antonio and Socorro, but there were no passes or leave periods at all until after the test.

SED personnel got $5 per diem while enroute between Los Alamos and Trinity. They did not get any per diem at Trinity. Officers temporarily assigned to Trinity got a per diem of $7 while on travel, and $5 per diem at Trinity. The usual transit time to Trinity from Los Alamos was figured at less than 9 hours, or one-quarter day.

All transportation to and from Trinity was handled through John H. Williams. Roads were rough and accidents common. A 24 March memorandum (Record Group 434) notes that many vehicles were in the shop for repairs.

A herd of horses ran across the road in front of Lieutenant Bush's sedan once, somewhere between Socorro and Base Camp. One tried to jump the car; but, instead, it landed on the hood, crushing it. The horse was killed. Bush managed to drive the car to Base Camp, where he took some kidding from his men. The wrecked car became a landmark in the camp (Benjamin, personal communication 1999).

Davis went to Socorro with the water truck once. He and other MPs also made regular trips to Los Alamos to bring in supplies, until the engineers arrived, as noted above. The engineers then took over the supply convoying. Davis went to Socorro almost every day for mail, and to the Illinois Distributing Company in Socorro to pick up beer. He came to know the owners, Marcella and Clarence Hammel. Davis (n.d.) recalled taking two or three men to the dentist in Santa Fe and taking Lt. Bush to the Albuquerque airport.

Rudolph (Rudolph n.d.:12) went out with MP jeep patrols on several occasions, and once went to Fort Bliss, Texas, to pick up some special equipment. He left Trinity Base Camp four or five times during his months there, and believed that this degree of

latitude was unusual. He went to Bruns General Hospital in Santa Fe [this would probably have been on a trip between Trinity and Los Alamos] to pick up medical supplies. He remembered going into San Antonio with an MP patrol to drink beer after a thirsty day in the desert, and added that most of the servicemen drank to maintain their morale. He remembered that the beer was "off brands" from Los Alamos. It was cheap, but not free. Rudolph believed that the drinking was not excessive, just typical of soldiers who were often bored.

At least two and often as many as ten trucks carrying equipment and supplies left Los Alamos every evening after dark (to avoid the desert heat and to escape notice), and arrived at Trinity early the next morning (Los Alamos Scientific Laboratory 1986:36). The drivers usually made a stop at the U.S. Engineer Office yard in Albuquerque to pick up items addressed to Prof. W. E. Burke, Physics Department, University of New Mexico. Dr. Burke acted as a blind to conceal the connection between Los Alamos and the items being sent (Los Alamos Scientific Laboratory 1986:36).

All personnel going to Trinity had to obtain a pink War Department pass stamped with a "T." This was presented to the Trinity guards at the border of the Trinity Site and exchanged for a badge that had to be worn at all times on the site. Another exchange took place when anyone left Trinity (Lamont 1965:124).

Entertainment

At their meeting on 8 March, Bainbridge, Stevens, Williams, and Davalos decided to get 16-mm movies for the camp personnel.

> We had a movie screen outside that showed movies a couple of times a week. If the weather was bad they were shown in our makeshift rec hall. Inside was a pool table and a couple of card tables and access to beer and soda. One of the biggest attractions was the roughhouse volleyball games. We had the net strung between our barracks and the latrine building. There was quite an audience at times, with all of the scientists there. (Davis n.d.)

Krohn (personal communication 1999) thinks that the outdoor movie screen was set up between the photo lab (No. 13) and the mess hall (No. 19). He recalls that here were movies every night.

The panorama (Figure 5) shows a baseball diamond on the east side of the camp. Davis (n.d.) said that engineers, MPs, and visitors all joined in baseball games. There were no regular teams; it was simply a matter of choosing up sides for a game.

Harold Smith played catcher. He remembers that he had a catcher's mitt, mask, and chest protector, and that "the equipment was pretty good" (personal

communication 1999). He recalled that Lt. Bush joined the baseball games once or twice. It was "just pickup" on a Sunday afternoon "when things weren't too busy." Smith specified that these were hardball games.

Davis (n.d.) commented on the wildlife present on the range:

> I was amazed at the amount of wildlife on the range, from the hundreds of antelopes down to the little desert tortoises that come out after a rain. There were a lot of big mule deer in the brushy ridges, quail, roadrunners, hawks, eagles, porcupines and coyotes. We also had a prairie dog town just north of Base Camp.
>
> I raised a young hawk [Oscar] that I had taken out of a nest in a yucca plant. It got to be a very large bird. I finally had to let it go but it stayed around base camp because I fed it meat scraps from the mess hall.

Ernest Wallis of the Photometrics Group built a special box for rattlesnakes. He put it in the back of his jeep and took it along whenever he went scouting camera positions (Figures 26 and 27). He also had two sticks, one with a loop on it. He accumulated an impressive collection of rattlers. One morning some unidentified, but presumably fearless rodent tried to dig into the box from beneath as it sat on the ground. All the snakes escaped, infesting the camp and stirring the military wrath of Lt. Bush, who ordered Wallis never to capture another rattler.

Ben Benjamin and Edwin York took a jeep and went out and shot an antelope one day, first asking Howard Bush's permission. "Go ahead," Bush said, "I'm the game warden down here, too" (Benjamin, personal communication 1999). One of the mess sergeants hung the carcass in the motor pool, and it was served the following day ["pretty poor" Benjamin commented].

Mule deer were on the menu regularly, Davis says, while antelope were mostly made into stew. Lamont (1965:6) says that the GIs systematically shot a large herd of antelope to prevent them from trampling the signal wires. Davis remembers only one antelope killed with a machine gun (on single fire), and denies the stories about a herd of antelope being killed. "I think the herds drifted away from the area of activity. You could get up on a truck in the motor pool with binoculars and see hundreds of antelopes on the slopes of the mountain east of Base Camp..." (personal communication 1998).

DePaula remembered that on several occasions he accompanied hunters in search of deer and antelope, although he did not hunt. The camp residents ate antelope steak and range beef (Los Alamos Scientific Laboratory 1986:39). Cattle belonging to the McDonald brothers and to others may have been taken without a thought to their owners. Omer Loyd and Abel Taveres shot a golden eagle—Davis thought with .45s—that tried to attack the dog Whitey (Davis, personal communication 1998). The bird remained hanging on the communications wire north of camp until Davis brought the body down and into camp (Figure 28).

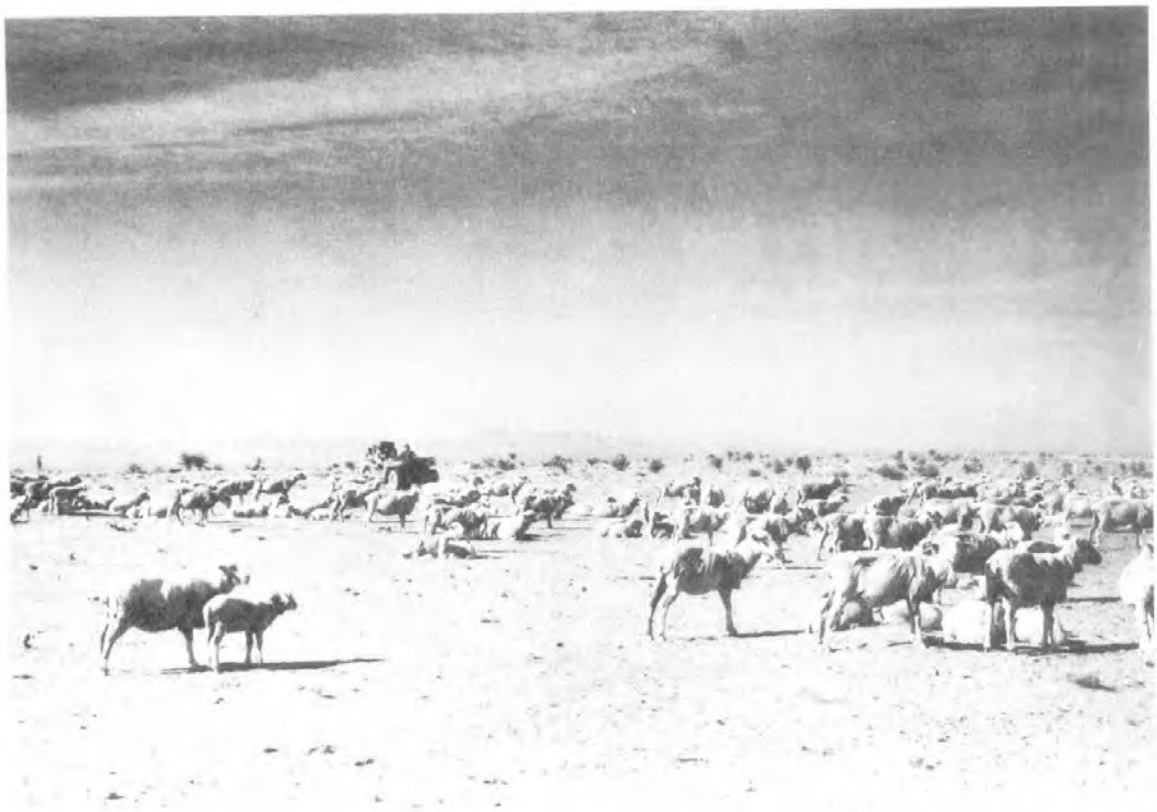

Figure 26. Sheep near Valverde. Ernest Wallis's jeep with snake box is visible in the background. Ben Benjamin and Ernest Wallis are in the jeep. This picture may have been taken by George Economou. *Courtesy Benjamin C. Benjamin.*

Figure 27. Julian Ellis Mack and Ben Benjamin scouting for camera locations northwest of Trinity. *Courtesy Benjamin C. Benjamin.*

Figure 28. Cpl. Omer Loyd (left) and Pfc. Abel Taveres, with the golden eagle they shot north of Trinity Base Camp after it tried to attack the dog Whitey. *Courtesy U. S. Army, White Sands Missile Range Public Affairs Office.*

Rudolph (personal communication 1998) did not hunt, but remembered one occasion when an antelope was brought into camp for dinner, and another time when a cow "ran into a jeep." He thought these were the only two such occasions.

A trapper was working close to Base Camp. Benjamin found a trapped coyote (personal communication 1999); however, he never saw the trapper nor learned his identity.

Whenever the engineers were off duty, they were permitted to use the military police horses. Many of the men took recreational rides in the vicinity. According to Davis, there were sixteen horses at the camp, but none was used until after the test, then only three or four were used for patrols, with only one horse being ridden at any given time (Figures 29-33). Each MP had a horse that he regarded as his own; in some cases two men would share a chosen horse. Lt. Bush rode his mare "Honesty," which was apparently the only horse not used by anyone else (see Figure 16). Rudolph rode on weekends, and remembered that all the engineers were welcome to use the horses, provided they groomed them.

Figure 29. MPs saddling horses at the stable. Left to right, Sgt. Sam H. Barnett. Sgt. Reno T. Moses, James McTigret, James Johnsey, Orris Jeffery, Lloyd Whitmore. *Courtesy U.S. Army, White Sands Missile Range Public Affairs Office.*

Figure 30. MPs near Trinity Base Camp. Lt. Howard C. Bush is at center. *Courtesy U.S. Army, White Sands Missile Range Public Affairs Office.*

Figure 31. MPs cleaning hooves at the corral at Trinity Base Camp.
Courtesy U.S. Army, White Sands Missile Range Public Affairs Office.

Figure 32. Marvin Davis, a military policeman, with Argo and Peergo. *Courtesy U.S. Army, White Sands Missile Range Public Affairs Office.*

Figure 33. Pvt. Carl Noble on patrol. Horses were not used much at Trinity Site. The distances were so great that jeeps and trucks were used for most transportation needs, according to Sgt. Marvin Davis. *Courtesy U.S. Army, White Sands Missile Range Public Affairs Office.*

The military policemen spent considerable time playing polo, according to Davis (Figure 34). They used a soccer ball and brooms from which the straw had been cut off. Lt. Bush eventually obtained real polo equipment for them, including wooden mallets, but there was some preference for the ball and brooms.

The military horses knew nothing about barbed wire and would paw the lower strands in the ranch corral. Honesty sustained a severe cut, from which she recovered. The lower strands were removed by the MPs.

One source reported that the medical sergeant (probably Simon Lernor) broadcast impromptu interviews and miscellaneous commentary (for example, about what the men were buying in the Post Exchange) over the public-address system to amuse the residents of the camp (Los Alamos Scientific Laboratory 1986:39).

Wilburn Dunlap mentioned that tension grew high as the atomic test approached.

> By this time here, by in July, those GIs would get out there and fist fight—as long as they didn't use a club...I've seen Captain Howard C. Bush walk right through 'em, and won't somebody say somethin' to him...the strain, the tension was gettin so, so tough to live with...I's tryin' to break the monotony....we was out west, when they brought Jumbo in there, and it was on a bypass...on the way in we killed the biggest rattlesnake we ever seen. He must have been that big around [gestures]. He must have been full of rabbits or rodents or somethin', and I cut his head off, his head, like that, so it'd be safe...I brought that in, and I laid it right on that middle step....I laid it on the barracks steps...when the GIs went to comin' out of that barracks to go to the mess hall, and when he [Bush] called me in about that rattlesnake, and he says 'Now you quit tellin' about that.'
>
> (Dunlap; personal communication 1999)

There were several dogs in camp. Marvin Davis inherited a collie, originally obtained from a sheep ranch (Davis thought it was the Herriot Ranch) by an older serviceman who was released before Davis. Davis took this dog back to Illinois with him and had him for more than 12 years. Lt. Bush owned a dog named Toff McButin (Figure 35). There was one dog in camp who had a habit of jumping at the triangle (which hung in a bracket outside the mess hall door) that was used to announce chow. After the triangle was removed and chow times were called by bugle over the P.A. system, the dog continued to jump at the place where the triangle had been, leading Rudolph to nickname him "Pavlov" (Rudolph, personal communication 1998).

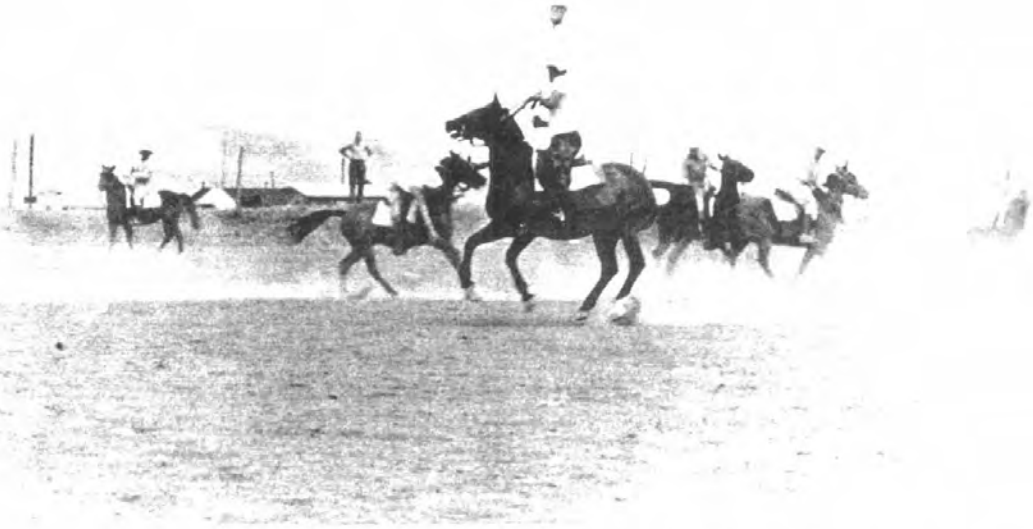

Figure 34. MPs playing polo with brooms. Looking south, Trinity Base Camp is in the background. *Courtesy U.S. Army, White Sands Missile Range Public Affairs Office.*

Figure 35. Howard Bush's dog, Toff McButin, in front of the motor pool, Trinity Base Camp. *Courtesy U.S. Army, White Sands Missile Range Public Affairs Office.*

Communications

The MP detachment used a 50-watt and six 25-watt stations for communication, transmitting over twenty 25-watt FM Motorola transmitters and receivers. The stations were on a frequency of 36.860 megacycles, with call numbers WZZZ-1 through 29.

Lieutenant Bush made telephone calls to Los Alamos from Base Camp, but he missed a meeting with Wilburn Dunlap one day because he had to go into town to call his pregnant wife on a civilian phone. Sergeant Richard O'Meara made calls from Trinity to Los Alamos on behalf of the civilian technical personnel.

Two SCR-299 450-watt transmitters were used for ground-to-plane communication and for long-distance, ground-to-ground communication (for example, advance warning of shot firing).

Two SCR-511 walkie-talkie transceivers were used when exploring for sites. These had a range of only 5 or 6 mi.

A telephone hookup connected the shelters and key offices. South 10,000, where Oppenheimer watched the test, had its own switchboard. The phones were operated by cranking a generator. Phone lines were laid between Trinity and Los Alamos. Transcripts of all conversations were relayed to the chief intelligence officer. A teletype was also installed at Base Camp so that messages could be sent directly from Base Camp to Trinity (Lamont 1965:121).

Security

According to DePaula, the servicemen were given no explanation of their mission. They were ordered not to discuss any of the affairs of the camp with civilians (for example, when accompanying the water truck to town). Davis, likewise, recalled that there was no explanation of the mission, but "we had our own ideas." Rudolph had learned, when at the Met Lab in Chicago, that the project was an exploding weapon. He believed that he was unusual, perhaps alone among the servicemen, in having some knowledge of this. "None of them knew anything; Lt. Bush must have known something" (personal communication 1998).

No telephone calls were permitted. All mail was censored in Los Alamos. Rudolph noted that a few of the servicemen received letters in Yiddish, which caused further delay, because the censor had to find a Yiddish speaker to read them (Rudolph n.d.:11). Rudolph remembered that he made one long-distance call to his wife while on official business either in El Paso or Albuquerque, and that when she asked about the weather, a military operator cut in and said, "Keep it personal" (Rudolph, personal communication 1998). He did not recall ever seeing a telephone at Trinity Base Camp,

although he assumed that Lt. Bush had access to one. The 10 October 1944 memo (Davalos 1944) states that there would be a telephone connection to the Mountain States line 4 mi from the camp, and that it would cost about $4,000. The telephone lines can be seen in the 19 May 1945 map (Figure 3).

Rudolph had the impression that military secrecy was so pervasive that the topic of secrecy itself was never discussed (Rudolph, personal communication 1998).

At its inception, the Manhattan Engineer District established a security section that protected personnel, sites, and information. In December 1943, a Counter-Intelligence Corps (CIC) was organized in the Manhattan Engineer District. The CIC, which grew to 143 officers and 156 enlisted men by July 1945, carried out intelligence and security operations in all the geographic areas of the Manhattan Project, including security checks and investigations of both the military and civilian personnel of the MED.

A special agent from the Los Alamos security office, John Anderson, came down as a representative of the Intelligence Officer at the Laboratory. Anderson took charge of the badge and pass system, the guard system, and communication between Trinity and the outside (Kunetka 1979:148).

Anderson rode herd on the men. On 10 May 1945, he interviewed Private Bert C. Sigler, who had left Trinity on an emergency furlough on 27 April. Sigler "stated that on his furlough he did not get drunk, had encountered no undue curiosity on the part of the people he met, and that he had not talked about his work." David P. Rudolph told Anderson that a waitress in Roy's Cafe in Belen had asked him and another soldier if they were from Los Alamos, and that he had riposted "Where is Los Alamos?" When she said it was near Santa Fe, he remarked that it was "a long ways away."

Anderson interviewed Private Keith F. France about eight of his personal letters. The Censorship Office had kept these. "His violations have been minor, but persistent" Anderson notes, mentioning that France had been brought in twice before. France was a radar technician who had been stationed at the Alamogordo Army Air Base and was then sent to Los Alamos, and from Los Alamos to Trinity. He said that he knew the work at Trinity concerned "an atomic bomb." Anderson reprimanded him for loose talk and censorship violations, and noted in his report, "His attitude seemed to be proper and this Agent believes him to be intelligent" (Report of 12 May 1945).

On 13 May 1945, Sergeant of the Guard Dirksen reported that he had seen two cowboys near a band of sheep that had been grazing just west of the west boundary of Trinity. Dirksen found the tracks from two horses that had been ridden to a well within Trinity. A military patrol had dropped a plunger in this well to keep it from being used. Dirksen found that the plunger had been raised and that water was being pumped into adjacent tanks. He also found about a hundred head of cows and calves, both within and outside the Trinity area. When Howard Bush heard about this, he gave orders to

have the pump dismantled. Dirksen had the metal tanks at the well drained, drove the cattle out of the corrals, and shut the corral gates. He told Anderson that he would check the place every day to see if he could catch trespassers.

Anderson also noted the tension between the GIs and the civilian personnel from Los Alamos. The Los Alamos personnel went back and forth, had occasional time off, and could take trips to town, but the permanent personnel at Trinity had no such freedom of movement.

Wilburn Dunlap talked about strict security that was no respecter of persons:

> We were finishing up a half circle around Ground Zero [this may have been pursuant to Williams's orders to remove all vegetation as a precaution against fires], a three-quarter mile half circle, July the fifteenth, and on the north outpost they had a corporal out there with submachine guns—it was two staff loads of military officers, big brass. They come out there just after the change of shift, drove up. He halted em, he stayed off, he wouldn't let me close to 'em—they didn't have no food or no water, and he had them out there, and all he had was his canteen, for four hours, and he had to stay out there until the MPs changed guards, so then Howard C. Bush had to come out and get 'em. When they come in...I was doing some final work there, and they were mad, oh they were mad, and they was thirsty...They were some of the biggest all kinds of brass in the service, I guess, two carloads of 'em, two sedans, and they had chauffeurs, well, they was snortin' and raisin Cain in there about that, 'bout that corporal keepin' 'em out there, and they wouldn't take no orders. Howard C. Bush come in. He was a captain then—he'd made captain. He just set 'em right on their tin ear, he said, 'That boy did his job, and if you all had a crossed him he'd a shot every one of you half in two. He was out there to do his job and he done his job. So I don't want to hear no more about it..' Now he was a captain, but he was in charge of the MP force, and he was talkin' to some of the biggest brass in the military... (Dunlap, personal communication 1999)

Dunlap also spoke of a planned meeting in the field with Bush at which "he didn't show," and Dunlap and Mace were detained by MPs. They were in an arroyo "three or four hundred yards north of the [guard] tower." They drove toward Mockingbird Gap and "just as we got out on top," encountered an MP jeep.

> ...he says 'Fall out and start walkin.' I says, 'We've had a hard day, we're tired, we're hungry, and if it's all right with you we'll ride with you into the camp or we'll drive this pickup to whatever speed you say.' And he studied that awhile, he left that windshield down on his jeep, moved the jeep out of the way over to the side, and put that submachine gun up on that [?] and all he said, 'Fifteen miles an hour.' I told Jack, I says, 'You watch him, you look out that back glass you watch him. If he makes any kind of motion we'll stop.' Well we had an old Chevy pickup, wasn't too good a shape...if we was in good ruts or somethin' we'd had to clutch it there every once in a while to stay on that fifteen miles an hour. So we went in to the MPs headquarters, and Howard C. Bush called us, and kept us under guard two hours...about two hours after—two hours—Howard C. Bush come in and he been by the telephone' and says, 'I forgot all about you.' I guess that's the first thing he ever forgot. He says 'My wife was givin' birth to her first child, and I didn't want to leave that telephone until I knowed they both's all right.' He told the guards to go on about their business...we set there and visited awhile

and he says, 'Well I know you're tired and hungry, you go on to the mess hall there and have supper.' It was late—GIs come in off guard-duty shift and they were linin' up to outside the mess hall, four abreast, you know how—I said, 'Well, I figured, Captain Bush,' I said, 'Look out there. We just don't have time and this...well no more than what we're here to stand in that line for chow.' He says, 'Just go on by and get up on that and go right on in'. We walked right on by, we got up on the platform on those three steps, little two-by-six platform with a two-by-four rail on each side, and the fight started. We's walkin' that line, see—you don't walk a chow line...you gonna get caught—well, we both got inside all right and got us somethin to eat...I don't know if this is a fact, but evidently Howard C. Bush sent two MPs over there and they set down over there...after we got there, so there wasn't no further reaction after we got inside..."

(Dunlap, personal communication 1999)

The Bomber Incidents

On 17 April 1945, a plane dropped a flare into the camp.

At 9:10 p.m. on 10 May 1945, a westbound bomber flew over the camp. Evidently, the crew mistook the lights of Base Camp for their illuminated targets. From 10,000 to 15,000 ft the bomber dropped a practice bomb that started a fire about 50 yd northwest of the stables. The fire truck was dispatched to put out the fire and several men calmed the frightened horses. Agent John Anderson picked up the 100-pound sheet-metal practice bomb. Searching further the next day, he found another bomb that had hit about 15 ft from the stables (he later found a third bomb behind the stables). Anderson took the two practice bombs to Alamogordo Air Base (AAB) and complained to the executive officer, Lieutenant Colonel Louis J. Logan (he also mentioned the flare that had been dropped in April). Logan called in a training officer, who explained that the bombs were loaded with five pounds of black powder each. Logan promised to investigate.

On 13 May 1945, at 9:50 p.m., a plane flying at about 15,000 ft dropped a 100-pound practice bomb into the camp. It landed in the motor vehicle parking area near the carpenter shop, making a hole in the ground "about two feet in diameter and eighteen inches deep." Bush called Colonel Logan at the Alamogordo Army Air Base. Logan was not to be found. Bush spoke to the Assistant Provost Marshal, asking that flights over Trinity be stopped.

The day before the atomic test, all bombing runs from AAB were canceled. When the test occurred on the morning of 16 July, several crews were sitting on their airstrips waiting to take off, since they needed the flight hours to qualify for active duty overseas (Kunetka 1979:161).

Davis remembered the bombing, and that Lt. Bush and another man [evidently Anderson] went to the Alamogordo Air Base to complain. Davis saw the bomb crater, which measured about 3 ft in diameter, near the motor pool.

The 100-ton Test (7 May 1945)

A preliminary test involving the detonation of 100 tons of high explosive (RDX) and a small quantity of fissionable material was carried out on 7 May 1945, to test procedures and calibrate instruments. The engineers were told that they could watch the 7 May test if they liked. DePaula elected not to ("I slept through it."). According to DePaula, most of the engineers did watch this test.

Wilburn Dunlap had laid out "X point" for the 100-ton test exactly one mile from Ground Zero.

> We chained it with a standardized tape and a thermometer. Then I triangled it off a baseline. I triangled that, see, to be sure that we were right...we were doing some more communications lines, figurin it out, and a C-47 landed in there [at] Ground Zero...They come in to check this mile...one of them was a captain...they come in there to check their mile....because they was gonna calibrate from the blast of this 100-ton— calibrate their instruments, that's what they's for...but they didn't get nothin', because it didn't even compare with—this here [the atomic bomb] blowed out the whole thing [Ground Zero], wasn't nothin' left..." (Dunlap, personal communication 1999)

In fact, many of the experiments devised to measure the explosive force of the atomic test failed because the yield was so much higher than estimated.

On 31 March 1945, John Williams ordered all mesquite and yucca cleared within a radius of 150 yards from the point of the 100-ton test. He also requested that the radius from 150 to 200 yards be cleared "entirely," and that a firebreak be cleared from 350 to 380 yards.

A contract crew built a 20-ft-high structure of heavy beams supporting a wide platform. Bainbridge ordered it stacked with the 100 tons of RDX in wooden boxes, with canisters containing the fissionable material at the center. When the crew returned from a mandated layoff, the structure had disappeared.

With Hitler's suicide and Germany's surrender, several of those at Trinity viewed their work in a different light, according to Segré (1993:199–200).

> The preliminary experiment was performed on May 7, 1945. While we were in the desert setting up the experiment, we received news of Hitler's suicide, of the surrender of Germany and of the end of the war in Europe. One of my reactions was, 'We have been too late.' For me Hitler was the personification of evil and the primary justification for the atomic bomb work. I am sure that this feeling was shared by many of my colleagues, especially the Europeans. Now that the bomb could not be used against the Nazis, doubts arose. These doubts, even if they do not appear in official reports, were discussed in many private conversations.

About eight men, of whom Robert J. Gibson was one, were sent into the test area following the detonation to take samples. They were given coveralls, which were

considered to be protective gear. Although Gibson did not remember just why the samples were needed, it is likely that they were used to trace the small amount of fissionable material.

The Atomic Test

Frank Oppenheimer, Robert Oppenheimer's brother and his assistant in preparing for the atomic test, arrived at Trinity in late May to find that "people were feverishly setting up wires all over the desert, building the [Blaw-Knox] tower, building little huts in which to put cameras and house people at the time of the explosion" (Else 1980:16).

President Truman had agreed to meet with Stalin and Churchill in Potsdam, Germany, sometime during the summer. Truman put off the meeting until 15 July to gain time for the test, knowing that if it succeeded, a Soviet invasion of Manchuria to confront the Japanese might not be needed, and Soviet claims in post-war Europe could be limited. In the first week of July, Groves decided to carry out the test on 16 July, weather permitting, so that Truman could be informed of the result while at Potsdam.

In the several days before the test, there were no regular meals—the mess hall was open 24 hours a day (Benjamin, personal communication 1999). On one occasion, Benjamin looked up from his lunch and saw General Groves and Colonel Farrell talking at the other end of the table "There was no officer's mess down there—everybody ate in one mess hall," he said. "They paid no attention to me. I got up and went back and told the guys I had lunch with General Groves and Colonel Farrell."

Richards (1993:75) wrote to his wife in Los Alamos of scarcely tolerable dust and heat in the Spring of 1945. The monsoon arrived in July, cooling temperatures and making the camp more livable.

Rudolph (n.d.:13) said that on the night of 15 July, "We all assembled in the open area where we set up our movie screen." Lightning was flashing and could be seen through the screen while the movie was being shown (about 9 p.m.). It did not begin to rain until later.

Thunderstorms burst over the Jornada about 2 a.m. on 16 July, drenching Base Camp and South 10,000, site of the master switches that would start the timing sequence for the test. Groves, Oppenheimer, and Jack M. Hubbard (the Cal Tech-trained test meteorologist) met at Base Camp by prearrangement for a weather conference. They made and revised several test schedules. Groves finally decided on 5:30 a.m., and went to call New Mexico Governor Dempsey to tell him that he might have to declare martial law (Rhodes 1986:666).

The summer storm, a gift from heaven to any Southwesterner, was a nuisance to the men of Trinity. Richards (1993:79) remembered that the reservoir at Trinity Base Camp, which had been dry, caught some water when the rains began about 1 July, and the night air was filled with the singing of thousands of frogs. Segré (1993:201) writes,

> I was awakened by a deafening noise whose origin I could not grasp. I got up and found that Sam Allison too had arisen. We took a powerful flashlight and went out to see what was happening. We found that a hole near our barracks had filled with water, and in it thousands of frogs were celebrating a love feast. We returned to sleep still uncertain whether the weather would allow the test, but shortly the announcement that the test would proceed at daybreak woke us up.

Davis doubts that anyone slept on the night of 15-16 July. "Most of us with an assigned job laid down with our clothes on, but sleep consisted mostly of napping and jumping awake. After a few hours, most of us just got up and stood around in the mess hall for coffee" (Davis n.d.).

The cooks began serving a breakfast of powdered eggs, coffee, and French toast at 03:45 a.m. (Rhodes 1986:667).

All the engineers were ordered to stand behind the berm of the earthen stock tanks on the north side of Trinity Base Camp. DePaula specified that all the engineers as well as all the military police who were not out on guard duty were required to fall out for the test. All the men were in full uniform, with full field packs and helmets. "We just had to sit there and sit there, and I believe it rained that morning too," DePaula recalled.

When asked why the GIs were ordered to fall out for the test, DePaula said he thought the leaders took the view that since everyone had worked toward this result, everyone had a right to see it (personal communication 1996).

Bus loads of visitors from Los Alamos and elsewhere started arriving at Compaña Hill about 2 a.m. Ernest Lawrence, Hans Bethe, Edward Teller, Robert Serber, Edwin McMillan, James Chadwick, and some Trinity staff who had no duties that morning were there. The shortwave radio that they had requested to advise of the schedule was dead. Future Nobel Laureate Richard Feynman, whose scientific career had begun with tinkering with radios as a boy, got it to work.

The arming party reached South 10,000 at 5:08 a.m. Bainbridge unlocked the master switches. Joseph McKibben started the timing sequence at -20 minutes at 5:09:45 a.m. Groves, Farrell, and Oppenheimer were all there, but when the final countdown began, Groves left for Base Camp—as a precaution, he wanted to be separated from Farrell and Oppenheimer.

DePaula remembered that the engineers were instructed to keep their backs to "the shot" and were then permitted to turn around to observe the nuclear cloud

through pieces of smoked glass that were issued for this purpose. These pieces of glass appeared to be lenses for welding helmets. The watching men felt the heat and the shock wave from the explosion.

Rudolph (n.d.:14) said, "Just before dawn, we were roused out of our barracks by a PA announcement. We were told to anticipate an explosion from the tower, which would provide a bright light display. We were instructed to lie face down, feet pointing to the tower, and not to look in the direction of the bright light until instructed."

Davis remembers that arc welder's glass was issued for watching the test, and that some of the men taped the square of glass to a piece of cardboard to view the test.

Davis noted that some of the MPs were at their regular stations (outside the camp) at the time of the test. He was assigned to accompany a technician whose task was to check for radioactivity after the test. They went up to the north end of the range, near the present Stallion Gate, and saw the test from there. They had been issued welders' lenses fitted into pieces of cardboard. The MPs who were not on duty, as well as the engineers, took shelter on the south side of the earthen tanks, as described by DePaula.

At 5:25 a.m. a green Very rocket went up, and a siren wailed briefly at Base Camp. There was a two-minute warning and another wail of the siren. The one-minute-warning rocket fired at 5:29.

Samuel K. Allison broadcast the countdown from South 10,000; it came into Base Camp over a loudspeaker. Allison was an experimental physicist who had been at the University of Chicago since 1930 and was a close associate of Arthur H. Compton, its president. He came to the Y Project from the Metallurgical Laboratory at the university, where plutonium production had begun in 1942 and where David Rudolph had also worked.

As Bainbridge gave the signal to Allison in the control center to start the countdown, Station KCBA in Delano, California, crossed wavelengths with the Trinity frequency. KCBA broadcast its morning Voice of America program to Latin America during the countdown. The listening camp heard Sam Allison's voice counting through the National Anthem, and continuing through Tchaikovsky's Serenade for Strings (Lamont 1965:229).

President James B. Conant of Harvard, General Groves, and Vannevar Bush observed the atomic test from a slit trench in Base Camp, according to Lamont (1965:5-6). Groves, however, says he was on the ground (Groves 1962:296).

Oppenheimer, Thomas Farrell, Donald Hornig, and Samuel Allison watched the test from South 10,000. George B. Kistiakowsky was also there; he was knocked down by the blast wave.

The witnessing scientists and technicians give Rashomon-like accounts of the explosion, groping for the words to describe the new thing that had been born. One phrase recurs: "an enormous flash of light", "an overwhelming white flash", "unbelievable brightness", "the unbelievably brilliant flash, "[a] flash of light so bright at first as to seem to have no definite shape." "A foul and awesome display," Kenneth Bainbridge also called it. "Unprecedented, magnificent, beautiful, stupendous and terrifying," Farrell said.

Several observers said that the explosion bore no comparison to anything ever seen before, which may be why Otto Frisch's muted, matter-of-fact description has such peculiar force. Six and a half years earlier, Frisch had skied through snowy woods near Kungälv, Sweden, with his aunt, the Austrian physicist Lise Meitner. They had sat on a log and, with a scrap of paper and pencil from her purse, between them had puzzled out the first theoretical model of nuclear fission. Now, having forgotten the dark goggles he had intended to wear, he sat on the flinty ground of Compañia Hill with his back to distant Ground Zero and listened to the countdown end: five, four, three, two, one...

> And then, without a sound, the sun was shining; or so it looked. The sand hills at the edge of the desert were shimmering in a very bright light, almost colorless and shapeless. The light did not seem to change for a couple of seconds and then began to dim. I turned round, but that object on the horizon which looked like a small sun, was still too bright to look at. I kept blinking and trying to take looks, and after another ten seconds or so it had grown and dimmed into something more like a huge oil fire, with a structure that made it look a bit like a strawberry. It was slowly rising into the sky from the ground, with which it remained connected by a lengthening grey stem of swirling dust; incongruously, I thought of a red-hot elephant standing balanced on its trunk..The object...ceased to rise but a second mushroom started to grow out from its top...And all in complete silence, the bang came minutes later, quite loud though I had plugged my ears, and followed by a long rumble like heavy traffic very far away. I can still hear it (Frisch 1979:164).

Gibson lay flat on the ground, face down, and did not look up, as instructed. Gibson (personal communication 1999) recalls that one of the cooks looked directly at the explosion and was temporarily blinded. Physicist Robert Serber also looked directly at the explosion and was blinded for about half a minute (Rhodes 1986:673).

Enrico Fermi performed an order-of-magnitude experiment, dropping small pieces of paper in front of him from a height of about 6 ft, during and after the passage of the blast wave. He measured a displacement of about 2.5 meters, estimating this to correspond to 10,000 tons of TNT. In fact, the yield was about 18.6 kilotons. Robert Krohn was standing next to Fermi. Groves also says he saw Fermi's experiment, and we know Vannevar Bush and James B. Conant were there with Groves (see notes on Camp Building C below). Future Nobel laureate Frederick Reines and James Hush were also in this group.

Segré (1993:201) says that it was strictly forbidden to take pictures of the event, but that "somebody had smuggled in cameras, and a young SED man in my group took color pictures of the explosion." In his biography of Fermi, Segré (1970:148) says that this was Jack Aeby, whose recollection is that Segré gave him a camera and instructed him to take the pictures (Aeby, personal communication 1997). "He showed them [the pictures] to me, and to avoid trouble we went to Oppenheimer and gave him a copy. I believe it was immediately dispatched to President Truman," Segré notes. Aeby's picture has become the best-known image of the event.

When Oppenheimer got back to Base Camp from South 10,000, riding in a jeep with Colonel Farrell, the MP horses were still whinnying in fright, the Aermotor windmills still spun with the energy of the blast, and the frogs had stopped singing.

Harold Smith drove one of the lead-lined tanks that picked up soil samples after the test. Although Smith did not recall the name of the scientist he drove for, it was certainly Herbert Anderson of Columbia University (Smith knew, and other sources confirm, that although Enrico Fermi was in the other tank, it never reached Ground Zero.). Smith says that they waited until the cloud had risen—about an hour after the test—then drove to the stubs that were all that remained of the Blaw-Knox tower. At first Smith could not hear what Anderson was saying over the headphones. Then he heard Anderson yell, "Get the hell out!" They wore coveralls and hats—what Smith described as "protective clothing" (personal communication 1999).

Fermi and Weil's tank broke down and they had to walk back (Rhodes 1986:677).

Smith (personal communication 1999) says that of all individuals exposed to the test, he received the greatest dosage of radiation, as shown by his film badge and a subsequent blood test. He was told that he might be sterile, "but I fooled them—I had six children after that."

After Trinity

Enrico Fermi and Samuel Allison left Trinity the day of the test. They had a couple of flats, and Fermi borrowed a tank of methane gas to inflate the tires (Lamont 1965:253). Most of the scientists left Base Camp immediately after the test, traveling by the buses that took observers to Compañia Hill.

Groves and his staff flew back to Washington to prepare a report to be used at the Potsdam conference between Truman, Churchill, and Stalin (Lamont 1965:254). Bainbridge and John Williams drove off to fish in the Rio Grande to the south. The MPs held a party for Lieutenant Bush.

The harsh, sweet smell of sagebrush after rain was infected with a novel stench: "a mixture of vanished smoke, chemicals and animal life" Lamont (1965:269).

An American bomber delivered the second nuclear weapon (Little Boy) to its target, Hiroshima, Japan, on 6 August 1945. The bomb exploded 1,850 ft above the city, damaging or destroying 70,000 of Hiroshima's 76,000 buildings and killing at least 100,000 people (five years later, deaths related to the bombing reached 200,000). A third atomic bomb (Fat Man) destroyed most of Nagasaki, Japan, on 9 August. The death toll there reached 140,000 by the end of 1945 (Rhodes 1986:733-740).

After Hiroshima and Nagasaki, the men at Trinity spent time listening to Armed Forces Radio, trying to learn how many points would be required for discharge. Bush arranged a long furlough—two weeks and a two-week extension—in September-October 1945. Bush told the men to write to him at the end of the first two weeks and to claim to be sick ("Say your eye hurts, say your toe hurts," as DePaula expressed it), then granted them another two weeks. DePaula spent his thirty days in Brooklyn. Half the MPs and engineers went on leave first; when they returned, the other half went (Davis n.d.).

The horses were sold at auction in Albuquerque (DeHart, personal communication 1999). There were still cattle in the vicinity. DeHart (personal communication 1999) saw some of them being gathered by local ranchers and driven toward their respective ranches.

Inspection teams from Los Alamos found radiation burns on cattle. About 75 contaminated steers were bought up at premium prices and shipped to Los Alamos and Oak Ridge for detailed analysis. In Alamogordo, crowds flocked to see Arnie Gilworth's 'atomic calf,' a frost-colored beast born shortly after the test.

The Army gave a Good Conduct Medal to the MP detachment, noting that there had been no cases of venereal disease in the six months beginning in January 1945.

Davis (n.d.) notes that "a bus load of WACs came down from Los Alamos and everyone really celebrated" on Christmas 1945. "That winter it did get cold with a lot of blowing snow, so the parkas and heavy winter gear came in handy. We thought they were off their rockers when they issued the parkas, as well as the mukluks and heavy mittens, but we used them."

Rudolph (n.d.:14) described the "cleanup and close down" after the atomic test. He said that the fire chief (Bourg, the engineer from Louisiana) confiscated a supply of laboratory alcohol, designating it a fire hazard, and stored it in the fire station. The men then visited the fire station with fruit juice and soft drinks. Rudolph remembers that he went to the Post Exchange, where Captain Bush was acting as store clerk, and bought grapefruit juice from him.

General Groves wrote to Captain Howard C. Bush on 21 July 1945, from his Washington office in the War Department, expressing his appreciation for Bush's "exceptional performance" and "tireless efforts to see that nothing was left

undone...From all sides there was commendation of the thoroughness of your arrangements." This letter was placed in Bush's personnel file. On 12 October he received the Legion of Merit, signed by Chief of Staff George C. Marshall. The citation stated that Bush's unit was

> ...required to remain on duty in an isolated location in the heart of the desert for a period of seven months. Living conditions were crude and monotonous, and recreational facilities practically non-existent. Despite the presence of these severe handicaps to morale, this officer, by his superb conduct, exceptional example and capable leadership, initiated and maintained throughout the tension and tedium of this trying period an outstanding morale and esprit de corps in his unit. By his expert command of his troops and careful guarding of a vital area, he prevented any occurrences which might have impeded the successful testing of the Atomic Bomb.

Bush applied for a commission in the Regular Army, which he received in July 1946. He later rose to the rank of colonel.

All the MPs and Special Engineers received letters of commendation. These were prepared by David P. Rudolph on Bush's orders.

A skeleton crew of perhaps 50 men remained at the camp, guarding roads and gates, when Davis left in February 1946. Men left in ones and twos as their discharges on points fell due. Davis noted that cooks, heavy equipment operators, and some MPs were still at the camp when he was discharged.

> "A few of the older men got their points along about this time [end of 1945] and were discharged. My turn came in February of 1946 with quite a few of the fellows that had come into the Army in late 1942. They took us to Los Alamos to turn in our clothes and equipment and then down to Ft. Bliss, at El Paso, for our discharge..." (Davis n.d.)

Several of those interviewed spoke feelingly of the frustration and boredom of being confined to Trinity Base Camp after the test, and after most of the men had left. "We laid around down there doing nothing" Robert Gibson said.

> "We were there a long while—it seemed like we were never going to get out of there. I was married—I hadn't been married about a year—I couldn't get out of that camp—it was good living and we were in no danger, I'm very thankful for that..." [He notes (personal communication 1999) that he was one of the last to leave (February 1946). He went to Fort Bliss to be discharged.]

Survey reports show that all movable property, including such varied items as a centrifugal jacuzzi pump, a pipe wrench, 226 coffee cups, 11 feather pillows, a wheelbarrow, and 2 egg whips, were shipped to Sandia Base in Albuquerque by 28 June 1946. This may be the approximate date, then, by which all Trinity personnel had left Base Camp (Reports of Survey in author's collection).

Ernest Wallis of the Photometrics Group returned to Chicago, where he went into business as a photographer. He enlarged a picture of the atomic test tower and put it in the window of his store. The image was classified, and this led to his being arrested and sent to prison (Benjamin, personal communication 1999). Benjamin was amazed to read a front-page article in the *Minneapolis Star* about the arrest.

The Atomic Energy Commission conducted test work at Trinity in the Summer of 1947. Trinity Base Camp was inspected by Corps of Engineers Captain George W. McMaughan in July. He reported that the place was dilapidated; the mess hall needed new water systems and paint inside and out; the barracks needed painting and air conditioning. The place also needed a new septic tank. McMaughan noted that female A.E.C. staff members would be down at Trinity, and recommended that separate facilities be built for them. "At the present time the dispensary is turned over to them, which creates certain difficulties when medical treatment is required" (Record Group 434, Memorandum of 14 July 1947 on stationery from Special Service Detachment, P.O. Box 632, Socorro, New Mexico.).

In November 1947, Trinity was activated for another non-atomic test. Minimal repair work was done on the buildings. A memorandum of 12 November indicates that Ranch Building 2 (No. 16) was being used as an orderly room and that two or three enlisted men were living there.

In November 1945, a National Park Service study team had visited Trinity and recommended that the site be declared a national monument as soon as security restrictions were lifted. The Park Service repeated this recommendation in 1946, 1948, 1950, and 1952. The Army said no each time, although it agreed to protect historic sites.

After the war ended, the McDonalds were permitted to return to the ranch under a cooperative-use arrangement. The date "8-22-51" written in the concrete of the cistern cover in the north porch of the ranch house (No. 16) may refer to this reoccupation. Soon after this, the U.S. Army renegotiated exclusive-use leases and the ranch became part of White Sands Proving Ground. The McDonalds were again ordered to leave the ranch. After lengthy litigation, the federal government formally acquired the ranch in the late 1980s (Rieder and Lawson 1995).

At some unspecified time, the Army tore down most of the camp, although Nos. 13, 16, and several other structures remained (see below). It is unlikely that the camp was bulldozed and burned; there is no area of fire-reddened soil in the immediate vicinity that is large enough to mark a fire of that size. Some of the structures may have been moved to the White Sands Proving Ground headquarters.

In 1965, the National Park Service made a special report urging National Historic Landmark status for Trinity. Bills were introduced in the House and Senate in 1966 and 1967 proposing the Trinity National Historic Site. Senators Anderson and Montoya introduced Senate Bill 222 in 1967. This bill proposed to identify and preserve historic

resources at Trinity, pending its establishment as a National Historic Site. It went to committee and was forgotten, but that same year the Trinity Site, including Ground Zero and the George McDonald Ranch headquarters, was declared a National Historic Landmark.

TRINITY BASE CAMP: THE STRUCTURES

The following notations refer to the aerial photo (Figure 2), Base Camp map (Figure 3), and the panorama (Figure 5). The numbers are those that appear on the Base Camp map.

In the panorama (Figure 5), the stable and the Lazy MP Ranch were behind the photographer, who was probably standing on the platform of the Army windmill (No. 9).

Most of the camp buildings and features have disappeared. Those buildings and features still on the site are so indicated in the following descriptions. the discussion will follow the physical layout and original numbering system of buildings and structures as shown in Figure 3, starting from the northwest area of base camp and going to the southeast area. Consequently, some building and structures will be out of numeric sequence (e.g., Building 19, Structure 38, Building 20).

Camp Building 1: Stable

The stable stood north of the ranch corrals (see Figure 3) and just west of the Lazy MP Ranch (Figure 36). According to Davis (n.d.), this was a partially walled structure about 50 or 60 ft long that served as a horse barn. This building was oriented east-west. There are no remains of it on site. The stable is also partly visible in Figure 29, behind a group of MPs who are saddling horses in the corral.

Camp Building 2: Lazy MP Ranch

This building stood north of the ranch windmill and corrals (Figure 37). It served as a blacksmith and saddle shop, and a saddle-storage area. This building had been located in Mockingbird Gap, and was dragged to the camp on skids by the military police. Davis stated that it was a mine building. The Mockingbird Gap mine had produced sulphide ores containing galena and sphalerite, and oxidized ores containing lead, zinc, silver, and traces of gold. It had not been worked since about 1920 (Lasky 1932:81).

Davis and Dunlap had the following comments about the Lazy MP Ranch building.

> The shop building was at an old abandoned mine about two miles east of Base Camp. We put it on skids and pulled it over to the corrals and fixed it up to be used as the blacksmith and saddle shops. The saddle shops also served as the barber shop. When we got too shaggy one of the fellows used the horse clippers and gave us a rough haircut. (Davis n.d.)

Figure 36. Lazy MP Ranch and horse barn west of the corral, Trinity Base Camp, 1 April 1945. *Courtesy Los Alamos National Laboratory.*

Figure 37. Lazy MP Ranch at Trinity Base Camp. The MPs skidded this structure down from the mining camp at Mockingbird Gap. *Courtesy U.S. Army, White Sands Missile Range Public Affairs Office.*

> They brung an old building there from an old miner's hut and they made their workshop, blacksmith's shop, out of it...In this country you wouldn't build a ranch house south of your stables...You see when they first come in there the MPs brought some horses, and that's seven hundred and thirty-five sections over there—and it was just too much for horses (Dunlap, personal communication 1999).

Ranch Structures 3: Troughs

These cement watering troughs were probably ranch features placed on the site by the McDonalds.

Ranch Structures 4 and 5: Water Storage Tanks

These water storage tanks, holding 6,750 and 8,000 gal, respectively, appear to be ranch features. Both sit at ground level and are still present at the site.

Camp Structure 6: Pump House

This "new pump house," as Figure 3 calls it, is an Army-built feature.

Camp Structure 7: Water Storage Tank

This massive feature, which is still present on the site, appears to be a military addition. Figure 38 shows the arrival of what is assumed to be this tank at Base Camp on 10 April 1945. The memorandum of 10 October 1944 (Davalos 1944) mentions "the existing 10,000-gallon storage tank." Since only one tank at camp was that large, and because it appears to have arrived after the October 1944 memorandum, it is possible that the memorandum mistakenly reported the capacity at 10,000 gal and was actually referring to Structure 4 or 5.

Figure 38. Unloading a water storage tank at Trinity Base Camp, 10 April 1945. *Courtesy Los Alamos National Laboratory.*

Ranch Structure 8: Water Storage Tank

This 1,000 gallon tank appears to be a ranch structure. Only the platform remains on the site.

Ranch and Camp Structure 9: Well

Davis (personal communication 1999) noted that a drilling crew from Fort Sumner drilled the new well (Figure 39) and that a member of the Coe family of Lincoln County was on this crew. Davis also said that water was pumped into the tank with an engine that had been left on the site by the McDonalds. A pump jack is visible in the panorama (Figure 5), next to the engine house. As noted above, this may have been the "second ranch well" referred to several times in memoranda, redrilled to increase its flow.

Ranch Structure 10: Well

Davis remembered that he was one of the team that put a new casing in the ranch well. Harris also remembered Davis working on the motor and the windmill of this well.

Ranch Building 11: Pump House

DePaula had no information about the use of this building, except to say that he was sure it was not a stable. Davis stated that this was the ranch's adobe pump house. The building was about 15 by 25 ft and may have housed a gas motor or a direct-current generator and battery (Rieder and Lawson 1995:53).

Richard J. Watts, who built health-monitoring equipment for the Trinity test, said in a 1993 interview that he had some equipment in one of the adobe buildings. He identified this building from a photograph as the one nearest the pump jack (Rieder and Lawson 1995).

The adobe walls of this building have melted. The tin roof is still lying where the building stood. There is a cistern or well in this building.

Ranch Building 12: Barn

Davis (personal communication 1999) said this adobe building was used for storing hay for the horses. He kept a cage in this building for his hawk "Oscar." He thought he might in fact have found the cage there to begin with. He remembered that this building gave indications of a mechanical use, with pieces of machinery and oil-impregnated surfaces.

The remaining walls of this building are two or three courses high.

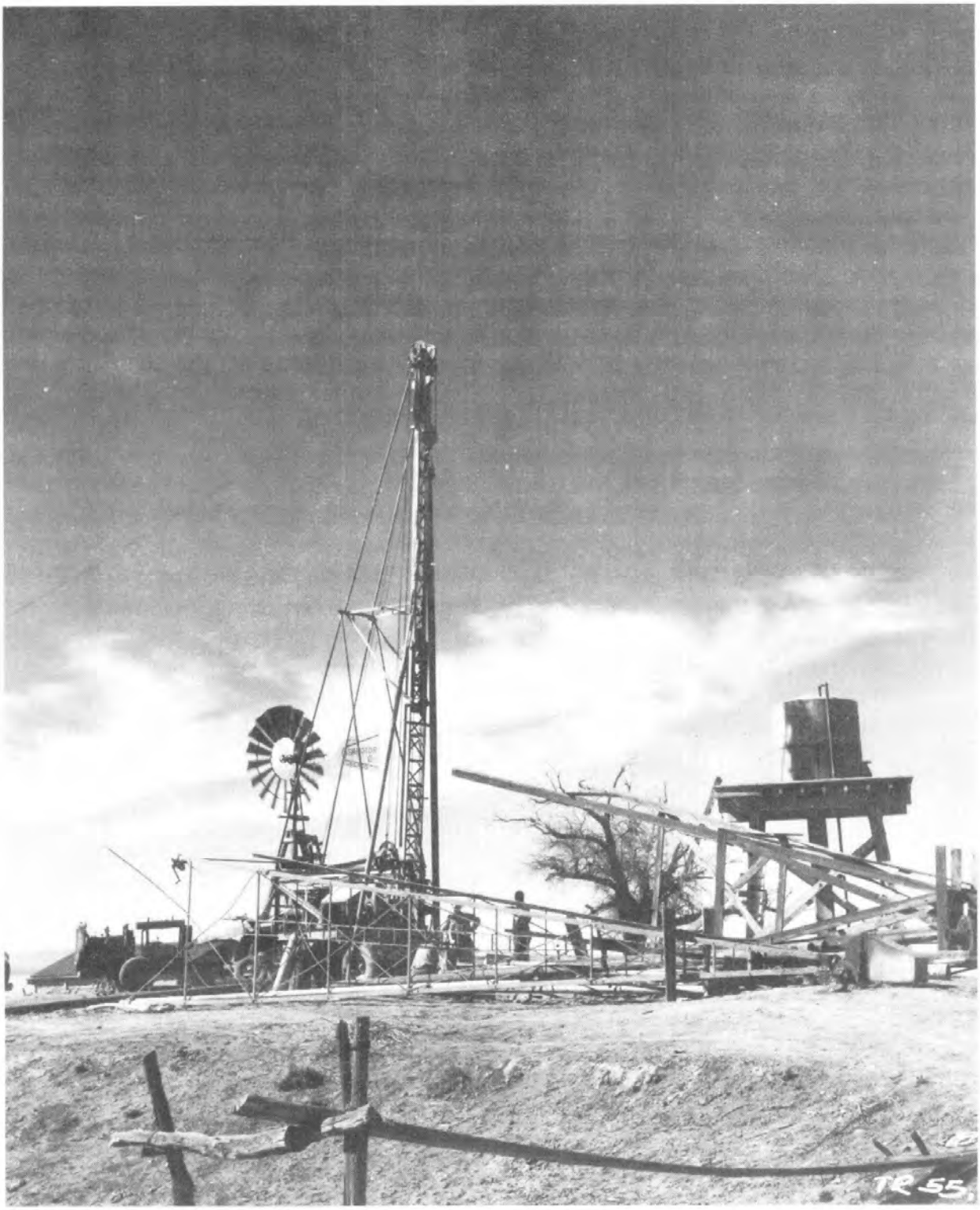

Figure 39. Well-drilling rig at Trinity Base Camp, 5 April 1945. *Courtesy Los Alamos National Laboratory.*

Ranch Building 13: 1938 Frame Ranch House

This frame house was originally the home of Ross McDonald. It measured about 25 by 40 ft and had a wood-frame addition running the full length of the north side. Exterior walls were finished with tongue-and-groove siding; the roof was corrugated metal. The house was probably heated with a wood-burning stove (Historic American Engineering Record [HAER] n.d.). It had four-over-four wood sash windows. The northern addition had three windows with six panes each (HAER n.d.).

According to a memo of 16 March 1945, this house was modified with electrical outlets at a height of 42 in., a shop bench, plywood facing to a height of 54 in. above the shop bench, two sets of four drawers below the east end of the bench, and an oil stove.

The house is identified in a 24 March 1945 memorandum from Bainbridge to "All Concerned with Project TR" as a photographic laboratory. Bainbridge noted that J. E. Mack had authority over the lab, and T/5 Ernest D. Wallis was in actual charge of it. Group G-11 used the building for print filing, print reading, and laboratory work, according to the 24 March memo (Figures 40 and 41).

Some members of the Photometrics Group or Photo-optical Group (known also as Group G-11) were Julian Ellis Mack (the group leader, a professor of physics at the University of Wisconsin), Harold C. (Curly) Barr, Benjamin C. Benjamin, George Economou, Berlyn Brixner, Arnold Kivi, Ernest Wallis, John Wahlen, and Edwin N. York.

While this house was in use as a photo lab in 1945, it had a photographic trailer backed up to its south side (see Figures 4 and 5). Figure 4 shows a flat north facade; Figure 5 shows the addition of a room on the north side of the building. This is the room indicated in dashed outline on the Base Camp map (see Figure 3), meaning that the room was built some time between 19 May and 16 July.

Electricity and running water were supplied to the house for photo processing (HAER n.d.).

DePaula remembered that photographer E. D. Wallis occupied this building ("He had his own bunk in here."). Davis did not remember Wallis; he did remember a photographer named David Foote. Davis did not believe that anyone lived in this building. What appears to be a swamp cooler can be seen on the northwest corner of the roof in the panorama (Figure 5). It is not likely that photos could be developed during the day in the desert in a building without air conditioning.

Davis noted that a 2-by-4 on the gable (east) end of this structure held a radar antenna.

Ranch Building 13 has been stabilized and partly restored.

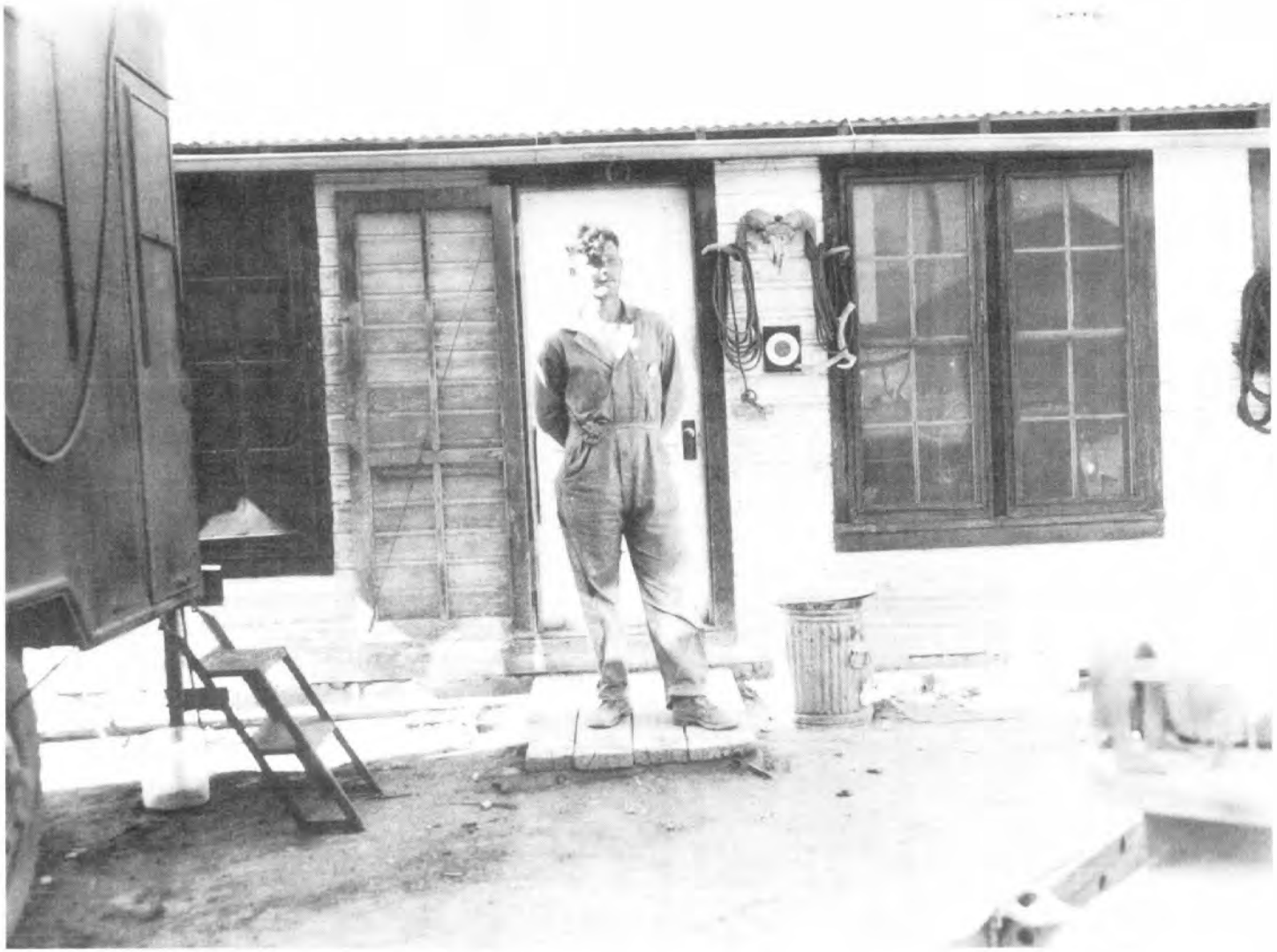

Figure 40. Ben Benjamin on the south side of Ranch Building No. 13, July 1945. Cameras, batteries, and film were stored here. The trailer at left was used for developing film, mainly 16- and 35-mm motion-picture film and still photos. The trailer was usable only in the cooler hours of early morning and late evening. The "fried egg" symbol on the wall next to Benjamin is an owner's mark used by Group G-11 in the days before serial numbers. *Courtesy Benjamin C. Benjamin.*

Figure 41. Ben Benjamin in Ranch Building No. 13. Note improvised water pipe, variable transformer, radio, and pin-ups. *Courtesy Benjamin C. Benjamin.*

Camp Structure 36: Cistern

This cistern collected water off the tin roof of the photo lab, Ranch Building 13 (Benjamin, personal communication 1999).

Camp Structure 37: Flagpole

President Roosevelt died on 12 April 1945. On the following morning, seeing the flag raised as usual, Ben Benjamin told the special engineer who raised the flag every day that it should be at half staff. When Howard C. Bush left the camp he took the flag, which he later donated to the National Atomic Museum at the Sandia National Laboratories in Albuquerque. It is on permanent display there.

Ranch Building 14: Shed

Benjamin says that this shed was used for general storage by the Photometrics Group working at Ranch Building 13. It may have been a ranch structure.

Ranch and Camp Structure 15: Generator Station

There was a ranch garage between the two ranch houses (HAER n.d.). A concrete floor was poured in this structure; it was then used to house a 50-kw generator plant. Two concrete slabs or footings are still in place. Nothing else of this structure remains. Davis stated that there were two Caterpillar generators.

Ranch Building 16: Ranch House

This H-shaped adobe was the ranch house of Dave and Mertis McDonald until 1942. Its central section measured 20 by 30 ft. The northern wing measured about 20 by 35 ft, and the south wing was about 25 by 50 ft. There were porches on the west side of the central portion and on the north side of the south wing. The central portion of the building had a pitched roof, and the wings had shed roofs. There was at least one interior fireplace. The house had four-over-four wood sash windows (HAER n.d.).

Ranch Building 16 was remodeled around the end of December 1944. Several rooms were repainted. The walls were brushed with a wire broom and then painted with a cold-water paint. Two rooms were refloored with 1-by-4-in. fir flooring (the new flooring was placed over the existing floor). One room had wallboard attached to one wall (the wallboard or insulation board was nailed to the existing adobe wall). About 115 squares of inch-thick insulation board were used to cover the existing wallboard

ceiling in one of the rooms (Memorandum from Joe B. Sanders to Operations Chief, 12 December 1944).

An oil stove was installed in the house by 24 March, and its doors and windows were repaired and weatherstripped. Gibson (personal communication 1999) believes that John Williams lived here.

The house had one room for a camp headquarters, with detailed maps and air mosaics mounted on the walls, and two steel file cabinets for safeguarding classified reports. A special map (scale: 6 inches = 1 mile), including N 10,000, S 10,000 and running nearly to W 10,000, was also put up on the wall here. An air navigation map for the region (giving the position of radio beacons and restricted areas for southern New Mexico) was kept in this building as well.

DePaula said he had little knowledge of the building; that he had actually entered it perhaps six times in nine months. Ordinarily he picked up the trash from outside the door. Trash here and elsewhere was typically thrown into 30-gal drums. However, Davis said that a weather observation team and a coast artillery searchlight team (an officer and two enlisted men) used the house as offices and for equipment storage, but that no one lived in it.

Groves (1962:293) says that Oppenheimer had an office in the Base Camp. This may have been just around the time of the atomic test. He also describes the discussion of the weather just before the atomic test. Rhodes (1986:666) says this happened in the weather center. Oppenheimer's office, then, may have been in this building.

A 24 March 1945 memorandum discusses the distribution of space in this building, indicating that the nature of its use had not been fully worked out as of that date.

The house has been stabilized and partly restored.

Camp Structure: Tent

The panorama (Figure 5) shows a tent located immediately east of Ranch Building 16. DePaula believed that this was used as living quarters by engineers who were on the site for a short period. Davis thought a weapons technician might have lived there (judging from the weapons carrier parked in front of the tent).

Groves states in his memoirs (1962:294) that he lived in a tent at Trinity Base Camp, sharing it with Vannevar Bush and James B. Conant. As there is only one tent in the panoramic photo, this may be Groves's quarters. Frisch (1979:163) also says "we lived in big tents and for varying times (about a week in my case) while all the preparations were made."

Camp Structures 17: Hutments

DePaula stated that these hutments, located immediately south of the generator station, were used for storage, not as living quarters. However, Davis specified that Lt. Bush occupied the westernmost hutment (first of five). He also stated that engineer officers may have had quarters in the others. He remembered that the easternmost hutment was used to store surplus clothing, parkas, boots, and gloves, among other items. Cloth foot covers, used when personnel went into Ground Zero after the test, were stored here. Davis could not recall whether they were washed or destroyed after being used.

Standard Army hutments were occupied by four officers or eight enlisted men. Figure 3 indicates that these were officer's quarters.

Camp Structure 18: Supply Room

The original map for Trinity Base Camp (Figure 3) indicates that this hutment was the supply room. However, as noted above, the location of supply room(s) and officer sleeping quarters in this row of hutments is uncertain. For this report, we have shown this room as a supply room consistent with the May 1945 map. However, as the project developed, it is very probable that the use of specific hutments changed to meet project needs. By the end of the project, the supply room could have been moved to the easternmost hutment as described by Davis.

Camp Structure A: Unidentified

We have no information about this structure. It is not on the May 1945 map of Base Camp (Figure 3), but it appears in the July 1945 aerial photograph (Figure 2).

Camp Building B: Latrine

This latrine is not in Figure 3, but it also appears in Figure 2. It was built for the scientists, technicians, and visitors who began to arrive in the camp in the Spring of 1945. The concrete slab from this structure is still largely intact. DePaula identified a concrete square with a border (approximately 2 in. wide by 2 in. high) as a foot bath.

Camp Building C: Barracks

DePaula identified this building as a barracks used periodically by visitors (not by the permanent contingent of engineers and military police). Davis also thought that this was a temporary quarters for visiting scientists and technicians.

According to Rudolph (personal communication 1999), the barracks were furnished with single bunks. There were also double-decker bunks in the Engineer barracks.

Krohn tentatively identifies this as the barracks where Oppenheimer and Frederick Reines lived before the test (Reines watched the shot here, while Oppenheimer was at South 10,000). According to this identification, Fermi was standing near the north end of this barracks when he did his order of magnitude experiment with bits of paper. Krohn noted that there were about twenty people there when the nuclear shot occurred. This was the only barracks from which there was an unobstructed view in the direction of the shot. Krohn states that Victor Weisskopf and James Hush were also there during the shot. Groves says he saw Fermi's experiment, so he, Vannevar Bush, and James B. Conant were in the immediate vicinity.

Camp Structures D: Hutments

These hutments are not on Figure 3, but they appear in the aerial photo (Figure 2). We have no information about them, but they may have been put up as officers' quarters for the high-ranking military visitors who came to observe the atomic test (this possibility is suggested by the fact that some of the hutments numbered 17 were also officers' quarters). The guest hutment (Figure 42) may have been reserved—as the sign suggests—for women scientists or technicians expected during the nuclear test.

Figure 42. Base camp guest hutment. *Courtesy U.S. Army, White Sands Missile Range Public Affairs Office.*

CCC Buildings

The major camp buildings were Civilian Conservation Corps (CCC), prefabricated affairs that were brought in and set up on the site. They included no fewer than four 20-by-100-ft units. According to the memorandum of 10 October 1944, the CCC structures were the MP barracks, the SED barracks, a barracks for technical staff, and a structure that served as a combined office, laboratories, instrument maintenance area, and officers' quarters; a 20-by-60-ft unit for service and supply; a 20-by-150-ft mess hall and kitchen; three 20-by-50-ft units (the commissary and quartermaster's supply warehouse, the first and second echelon repair building, and a warehouse for technical supplies and storage); and a 150-man latrine. If we attempt to analyze Figures 2 and 5 using these dimensions, it appears that the buildings identified below as 20A, B, C, D, and E; 24-25; and 26 may have been 20 by 100 ft. The only structures that are clearly of lesser dimensions are A, 21, and 28.

Camp Building 19: Kitchen and Mess Hall

DePaula stated that the north-south wing of this building (entrance and east side) was the mess hall, while the east-west wing on the west side was the kitchen (Figures 43 and 44). The panorama shows an open bay in the northwest corner of this wing. DePaula stated that he picked up trash here.

There are three large tin exhaust vents lying on the ground immediately west of the footprint of the mess hall (Figure 43). One has an attached chimney. A second detached chimney may be associated with a second vent. One of the chimneys may be the one that appears on the roof of the mess hall in Figure 2. The flashing attached to the vents shows that they were mounted on a sloping roof. Figure 2 gives no indication of the placement of the second and third vents. However, an undated photograph shows the structures projecting above the roof of the mess hall. This photo is evidently earlier than the panorama (Figure 5). For example, it only shows two hutments, rather than five, south of the generator. In the panorama, the three chimneys have disappeared from the roof of the superstructure.

A swamp cooler was added to the mess hall around May 1945 (see Figure 43; HAER n.d.).

The panorama shows a latticed box behind Camp Building 19. It resembles a hutch. DePaula stated that the camp had no rabbits and no chickens, however. Davis believed that this was a trash bin. DePaula stated that a grease pit and septic tank were located immediately behind (the east side of) this building.

Rudolph remembered the triangle that hung in a bracket near the door of the mess hall. It was replaced by recorded bugle calls over the PA system.

Figure 43. Soldiers and scientists at the mess hall (No. 19). H. C. Barr, in light clothing, is third from left; Ernest Wallis is second from left. Wallis's jeep with the snake box is parked in the foreground. Building 20A (MP barracks) is in the background. *Courtesy U.S. Army, White Sands Missile Range Public Affairs Office.*

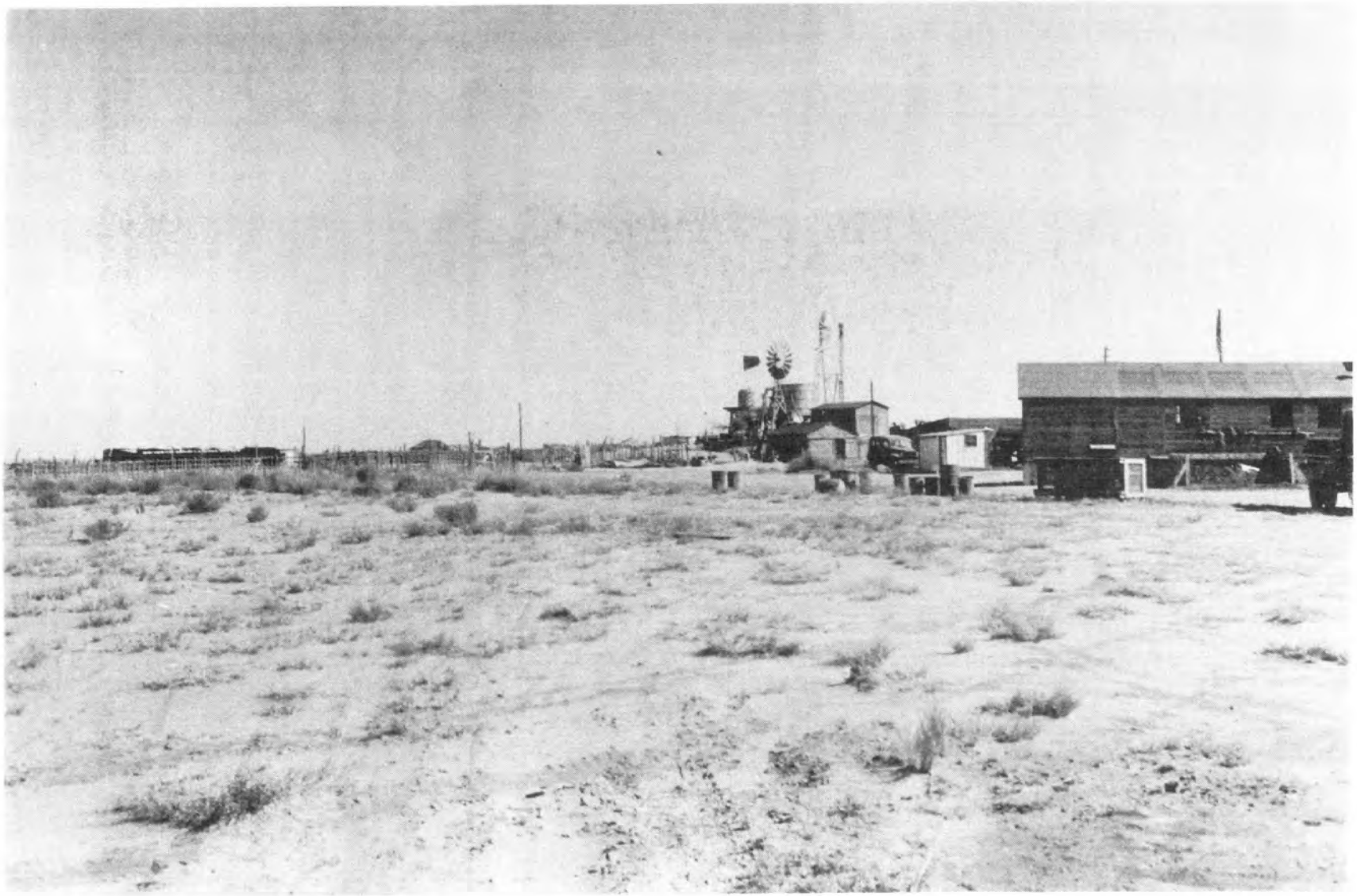

Figure 44. View to the north from the west side of Trinity Base Camp. The mess hall is in the right foreground. On the left are the corrals, with the horse barn oriented east-west, and the roof of the Lazy MP Ranch just visible above the corrals. *Courtesy U.S. Army, White Sands Missile Range Public Affairs Office.*

Camp Structure 38: Grease Trap

Figure 3 identifies this as a grease trap. This trap has disappeared.

Camp Structure 39: Septic Tank

Figure 3 identifies this as a septic tank. The slab is still there.

Camp Building 20A: Barracks

DePaula said that this barracks housed military police. Davis specified that the center section of the building (approximately 70 ft) was a military police barracks, and that he was quartered here. He stated that the north end of the building (some 15 to 20 ft) housed an orderly room on the east side and a room for the senior noncommissioned officers on the west side. He said that at the south end of this building (approximately 10 ft) the stable crew was housed. Rudolph also stated that this barracks housed military police.

Building 20A had separate rooms at each end, according to a memorandum of 12 November 1947.

DeHart said that this was his barracks and that it also contained the orderly room. He noted that the barracks had room for 20 to 25 men. He had a separate room in the south end. He also slept for some time on a cot in the orderly room, where he could hear the phone (this was in the spring and summer of 1946).

Davis remembered that the noncommissioned officers were 1st Sgt. Richard O'Meara and Tech Sgts. Carl Dirksen, Sam Barnett, and Reno Moses. The tech sergeants commanded the guard sections. He believed that there were 18 to 20 men in each guard section. There were two guards at the north gate, two stationed west of the camp, and two at Mockingbird Gap. These six guards served eight-hour shifts. Accordingly, 18 men stood post during each 24-hour period.

Camp Building 21: Latrine

There was a hot-water boiler on the north end of this structure. It was coal-fired, according to DePaula. Consistent with the HAER report, this may be the first latrine constructed. Davis noted that the foot bath had no outlet and consequently could not be cleaned. He drilled a hole through its north wall with a star drill, barking some knuckles in the process.

The concrete slab from this structure is still in place.

Camp Building 22: Post Exchange/Recreation Hall

Harris (personal communication 1999) says that he and other MPs remodeled a "square, CCC-type building" in the Spring of 1945 to serve as the post exchange.

Davis noted that the north end of this structure was a recreation hall consisting of three hutments, the center section was a post exchange (another hutment), and the CCC-built structure on the south (see Building 21 above) was a latrine. He thought that these sections were built separately, but that, when completed, they constituted a single extended structure. He stated that a room ("cubbyhole") partitioned off to the north of the latrine was the armory (marked "a"), where M1 carbines, pistols, and ammunition were kept. Adjacent to the armory was a storage area ("s") where items, including cases of soda, were kept handy to the recreation hall. Rudolph also remembered that the post exchange was here.

Davis said that the men played volleyball adjacent to the recreation hall (the volleyball net is indicated by a dotted line between Buildings 20A and 21). He added that there were seats around the net and in front of the post exchange, and that the men gathered here to drink beer and sodas and to watch volleyball games.

Camp Building 20B: Barracks

DePaula identified this building as his barracks, which was occupied by special engineers. He said there were about 25 engineers in Building 20B and an additional 25 in Building 20C (DePaula and Rudolph, however, agreed on an approximate number of 40 engineers.). Davis disagreed, saying he thought this building was used as a command post, not a barracks. He believed that Col. Stafford Warren, the chief medical officer, may have been quartered here on the night of the test. Rudolph believed that Camp Building 20B was a barracks for technical personnel from Los Alamos. Davis thought that there were radios in this building on the morning of the test, and that the countdown and communications were coordinated from this structure. Harold H. Smith (personal communication 1999) believed that this was the SED barracks.

The 1947 memorandum cited above specifies that this building was a single, large room.

Camp Building 20C: Barracks

DePaula stated that this barracks was also occupied by engineers. Rudolph specified that this was his barracks, and that it was fully occupied by engineers.

Camp Building 20D: Barracks

Davis believed that this building was the second engineer barracks. Rudolph specified that those engineers for whom there was no room in Building 20C lived in Building 20D, but that they did not fill this barracks, which was also used for general storage.

Camp Building 20E: Laboratory?

A 24 March 1945 memo says that the "southwestern base camp building is available for laboratory use for two-thirds of its length." This may be Building 20E. It is evident from the memo that the distribution of space in this building had not been fully worked out as of 24 March.

Davis remembered that while he was stationed at Trinity Base Camp, coal-burning stoves were removed from the various barracks and piled behind this building. They were replaced with oil-burning stoves. DePaula, however, was sure that the engineer barracks where he lived had only a coal stove while he was there. As noted above, he stated that the latrine (Camp Building 21) had a coal stove for heating water. Perhaps some but not all of the coal stoves were replaced.

Camp Building 24–25: Infirmary/Laboratory

Figure 3 shows that this building had an infirmary in the north end and a laboratory in the south. "Medical technicians checked our blood every couple of weeks," Davis (n.d.) writes. He said, further (personal communication 1998), that after the Trinity shot, two nurses from Los Alamos came to Trinity Base Camp several times at intervals of about two weeks to take blood samples from all camp personnel. He stated that they worked in this building.

Rudolph said, "The only medical coverage available was in the form of a corpsman (rumored to have started a medical education) supervised by Lt. Bush" (personal communication 1998, Rudolph n.d.:12). When Rudolph got sick at Trinity Base Camp, he had to be transferred to the station hospital at Los Alamos after the corpsman overdosed him with sulfa (Rudolph spent about a week recovering in Los Alamos, then returned to Trinity.). Rudolph remembered that Bush told him later (after the war) that the corpsman had been a medical student. Rudolph stated that the corpsman was not an engineer, but might have been an MP. DePaula identified the corpsman as Cpl. Lernor and added that he became a sergeant as a result of the general promotion after the test. Davis identified him as Simon Lernor of Beloit, Wisconsin, and added that Lernor administered a flu shot to him and made him sicker. The medical officer referred to in the 10 October 1944 memo was probably Col. Stafford Warren.

Camp Building 26: Fubar Stock Room

The main warehouse was the building sometimes called "Fubar" (fouled up beyond all recognition) by informants. FUBAR was an "official designation" (Los Alamos Scientific Laboratory 1986:37). The building contained electrical supplies, plumbing supplies, and hardware, according to Benjamin Diven (Merlan 1997; Rieder and Lawson 1995). This was also the site where face shields were manufactured by enlisted men (presumably engineers). One source believed that the face shields were made from aluminum sheets mounted on a stick handle, with welders' goggles for a window (Los Alamos Scientific Laboratory 1986:37). However, we also know that there were face shields consisting simply of a welder's lens set in a piece of cardboard.

The memorandum dated 12 November 1947 says that "the old Fubar stock room has been made into a day room." It contained a ping-pong table, pool table, refrigerator, and piano in November 1947.

Camp Structure 27: Hutment

Assistant post engineer Robert Gibson (personal communication 1999) says that his office was in a hutment in this general area, south of his barracks. This structure best fits his description.

Camp Building 28: Motor Pool

DePaula stated that his truck was usually parked here when not in use. He usually drove a GMC, one-ton, four-wheel-drive truck, but there were several other trucks he sometimes used. The slab for this building is substantially intact. There are two grease pits. DePaula conjectured that the eastern pit was built first, and the western one somewhat later, by a larger contingent of workers. He remembered that he and other engineers poured the slab for this building. A set of initials scratched in the wet concrete of the slab may refer to either Bresnahan or Brooks, two of the engineers who worked on the construction (personal communication 1998).

Camp Structure 29: Gasoline Tanks

These are identified in Figure 3 as gasoline storage tanks.

Camp Building 30: Fire Station

Davis identified these buildings as the fire station. Rudolph remembered that the fire chief was an engineer named Bourg who came from Houma, Louisiana. Sgt. Loren Bourg had been a civilian firefighter. At Trinity, he said, "I found I was the fire department, period" (Davis n.d.).

Camp Building 31: Office/Warehouse

Figure 3 identifies this as an engineer office and warehouse. It appears from the aerial photo (Figure 2) that this building consisted of three joined hutments.

Camp Structures 32 and 33: Hutments

Figure 3 identifies these as a plumbing shop and an electrical shop.

Camp Structure 34: Carpentry Shop

Figure 3 identifies this as a carpentry shop.

Camp Structure 35: Water Storage Tanks

DePaula remembered the construction of a 2,000-gal tank that was filled from a water truck. The water was supplied by the ice house in Socorro. Before these tanks were built, the supplies of fresh water were inadequate and the hard water was unsatisfactory for washing. DePaula remembered that the water truck went to Socorro about three times each week.

Dump

During the site visit of 4 November 1998, the camp dump was not located, although DePaula thought the most probable location was about 300 yds. south and east of the motor pool.

The dump is clearly visible on the aerial photo (Figure 2). It was a trench approximately 100 ft long that ran northwest-southeast. Its floor was about 8 ft below grade, with berms of the fill on both sides. Trash was dumped from 30-gal drums into the pit. Trash included the refuse of food, papers, snapshots (several of which DePaula retrieved), wire, containers, and other miscellaneous refuse. DePaula said it was likely

that chemical waste, oil, and other hazardous materials and liquids were also thrown into the dump. If this site is tested or excavated, the potential for hazardous contents should be a concern.

CONCLUSION

Although most of the structures of Trinity Base Camp were destroyed or removed by the U.S. Army, Human Systems Research, Inc., under contract to White Sands Missile Range, has stabilized the ranch houses (Ranch Buildings 13 and 16, and corrals). The rest of the camp remains as a historic archaeological site to testify to the unique events described here.

The invention of a nuclear weapon may be the most significant human event of modern times, because it created a new human condition. The atom bomb and its successor, the hydrogen bomb, not only breached the walls of the nation-state beyond mending, but made the end of all life on earth a permanent possibility and an inescapable calculation in human affairs. The bomb made Lincoln's hoped-for "just and lasting peace among ourselves, and with all nations" the only acceptable solution to the permanent global dilemma that Trinity brought into the world.

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Important sources are on file in the National Archives (National Archives and Records Administration, College Park, Maryland). Note that materials in the same record group may be physically separated. Textual records are on the second floor, cartographic records on the third floor, microfilm records on the fourth floor, and still pictures on the fifth floor. The following materials are referenced in this report.

Textual Records

Record Group 77, "Records of the Office of the Chief of Engineers."

Record Group 77, Entry 5, Boxes 72–74, "General Correspondence of the Manhattan Engineer District for the period 1942–1948." See Decimal Files 600.1 and 600.1-600.12. This file contains memoranda and plans for construction at Los Alamos in early 1945.

Record Group 77, Entry 5, Box 74, "Preliminary Drawings" of (1) personnel and instrument shelter, n.d.; (2) concrete recording chamber, 9-30-44; (3) viewing port detail of concrete recording chamber, 10-5-44; (4) details of anchor bolt, port cover, and shelf for concrete chamber, 10-2-44; and (5) preliminary sketch of vehicle shelter n.d.

Record Group 77, Entry 13, Boxes 130–135, "Records of the Office of the Commanding General, Manhattan Project." Contains fiscal and audit files.

Record Group 77, Entry 5, Box 46, File 200. 6 (in Stack Area 390, Row 1, Compartment 1, Shelf 7). Contains material on awards and citations issued by the Manhattan Engineer District, including a citation issued to Howard C. Bush.

Record Group 77, includes File 395, "Historical Record of Civilian Conservation Corps Camp Buildings, 1935-1940."

Record Group 77 (in Stack Area 130, Row 75, Compartment 36), includes the office diary of Leslie R. Groves for the period December 1944–July 1945.

Record Group 434, Department of Energy materials (filed in Stack Area 650, Row 9, Compartment 21, Shelf 2). These materials were assembled in consideration of a proposed Atomic Bomb National Monument. They were transferred from the Department of Energy Archives, Germantown, Maryland, to the National Archives in 1992. This record group contains numerous internal memoranda about the construction and operation of Trinity Base Camp. Additional materials may be held by the Department of Energy, but to date we have not located these.

Original proposal for an Atomic Bomb National Monument dated 12-20-45 and signed by National Park Service Regional Director M. R. Tillotson. The illustrations include a picture of the Base Camp while still intact and occupied. This is an internal National Park Service document.

Record Group 319 (Stack Area 270, Row 19, Compartment 31, Shelves 3-5 [13 boxes]). Working papers for *Manhattan: The Army and the Atomic Bomb* (1985) by Vincent Jones. Jones's discussion of Trinity is based mainly on the Manhattan District History, Bk. 8, Vol. 2 (see below).

Microfilm Records

The Armed Forces Special Weapons Project's "Manhattan District History" was assembled at the direction of General Groves, under the general editorship of Gavin Hadden, a civilian employee of the Corps of Engineers. This is a series of historical narratives prepared by each of the programs and activities of the Manhattan Project. The "History" comprises thirty-six volumes in eight books. Book 8, Vol, 2, deals particularly with preparations for the atomic test.

The Harrison-Bundy files are records of George L. Harrison and Harvey H. Bundy, two special assistants to Secretary of War Henry L. Stimson. These files contain high-level correspondence and cables (e.g., between the Secretary of War and his assistants, the Secretary of War and the Chief of Staff, several scientists and representatives of foreign governments) about atomic energy. They also contain minutes of policy committee meetings, a documentary diplomatic history of the Manhattan Project, and drafts of bills for the control of atomic energy. See M 1108 files (also see National Archives and Records Service).

Still Picture Records

Still photos of the Trinity area, including some unpublished pictures of Trinity Base Camp, bunkers, and experiments are in the Still Picture Branch, NWCS, National Archives and Records Administration, College Park (Room 5360). The still photos are part of Record Group 434.

Photo Number 327 is the aerial photo of Base Camp cited in text as Figure 2. This is classified by the National Archives as a still picture, not an aerial, because it was taken from a plane with a conventional camera, and is not using formal aerial photography techniques.

APPENDICES:

Appendix A. Biographies of the Veterans Interviewed

Appendix B. Selected Archival Documents Relating to the Establishment of Trinity Base Camp Personnel and Equipment

Appendix A.
Biographies of the Veterans Interviewed

Benjamin C. Benjamin was born in Mackintosh, South Dakota, on 17 November 1922. He attended the University of Minnesota for one year, studying engineering (he was also in the Reserve Officers' Training Corps), then went to work for Minneapolis Honeywell, making lenses and prisms for fire-control instruments. Benjamin joined the U.S. Army after Pearl Harbor at Fort Snelling, Minnesota, and was sent to Aberdeen Proving Ground for basic training. Because of his ROTC experience, he was ordered to remain as an instructor in basic training. After almost a year, he was transferred to Camp Santa Anita (that is, the Santa Anita Racetrack in California) to help establish an ordnance-replacement training center (the racetrack had been the site of a Nisei internment camp; however, the Nisei prisoners were subsequently moved from the coast and sent to inland camps out of fear that they might form a fifth column in the event of a Japanese invasion). At Camp Santa Anita, Benjamin saw a notice of a test for admission to the ASTP (Army Specialized Training Program, a program of accelerated math and engineering studies). He was admitted to the program, and studied engineering at Carnegie Tech in Pittsburgh. He graduated and was sent to Oak Ridge, Tennessee, and then to Los Alamos in 1944. Benjamin first went to Trinity in the Spring of 1945 as a member of a photography group. He was 22 years old. He left Trinity two or three days after the atomic test, but returned several times to pick up materials and equipment. He returned to Los Alamos, and was discharged at Fort Bliss, Texas, in February 1946.

Marvin R. Davis served at Trinity Base Camp as a military policeman in the 4817th Unit of the 8th Service Detachment, U.S. Army Corps of Engineers, between December 1944 and February 1946. An Illinois native, he was drafted and reported for service in Peoria, Illinois, in December 1942. He was sent to a staging area (Scott Field, east of St. Louis, Missouri) to take shots, and pick up his uniform and gear before being sent to Fort Riley, Kansas, then to Fort Wolters, Texas, and on to Los Alamos, arriving there in January 1943. At Los Alamos, Davis was on sentry and patrol duty, as were the other Military Police (MPs). He was ordered to Trinity Base Camp in December 1944 at the age of 22. He remained there until 14 or 15 February 1946. Davis was ordered back to Los Alamos and then to Fort Bliss, Texas, to be discharged on 21 February 1946.

Roy C. DeHart was born in Spray, North Carolina, on July 10, 1920. He was inducted into the U.S. Army in December 1942 in Roanoke, Virginia, and was sent to Camp Lee (now Fort Lee) in Petersburg. He then went to Fort Riley, Kansas, for MP basic and cavalry training. He was sent to Camp Wolters, Texas, for two days, then to Santa Fe by train ("the people come running round and wanted to know what was going on when that passenger train came in town."). Army trucks were waiting to take the troops to Los Alamos (14 February 1943). He was in Los Alamos, in the 4817th Unit of the 8th Service Detachment, U.S. Army Corps of Engineers, until January or February 1946. DeHart patrolled Los Alamos and the vicinity, including Anchor Ranch. Captain Howard Bush and Maynard Dixon came to take him to Trinity Base Camp, where he replaced Wilbur Ruhlow as stable sergeant. DeHart was 25 years old and was at Trinity for about seven months. His term of service ended and he signed on for a six-month extension; but he came down with rheumatic fever and was discharged in August 1946.

Felix DePaula served at Trinity Base Camp as a member of the Engineer Detail of the 4817th Unit of the 8th Service Detachment, U.S. Army Corps of Engineers, between February and October 1945. A native of Brooklyn, New York, he was 18 years old when he arrived at Trinity Base Camp. DePaula was drafted in October 1944 and was sent, first, to Fort Belvoir, Virginia. He arrived at Los Alamos around 5 January 1945, then was ordered to Trinity Base Camp, arriving there around 15 February. He remained at Trinity Base Camp, except for occasional trips into Socorro and to Los Alamos, until October. He was then ordered back to Los Alamos, where he was discharged around 16 July 1946. His principal duty at Trinity Base Camp, for which he volunteered, was picking up trash in the camp and hauling it to the dump.

Wilburn T. Dunlap was born on 10 April 1914, in Dawson County, Texas, to a farming and ranching family. When dust storms drove them off the land in 1916, they moved to the Roswell area by covered wagon. The family returned to west Texas before WWI to farm and ranch in several areas, including the Slayton vicinity, then they moved back to New Mexico in 1928. Dunlap attended the New Mexico Military Institute and the University of New Mexico. He applied for government service and began working as a surveyor on 13 December 1941, laying out what became Walker Air Force Base. A travel order issued by R. E. Cole, District Engineer of the Albuquerque District, U.S. Engineer Office, and dated 21 November 1944, orders Dunlap to proceed from Roswell to Alamogordo "on duty connected with flood control work." Dunlap worked for the Roswell suboffice for the duration of the war. He was 30 years old when he met Lieutenant Howard C. Bush near the George McDonald Ranch.

Alva R. Harris was born on 22 February 1924, in Sugar City, Idaho. He was inducted into the U.S. Army in January 1943. Harris was sent to Fort Douglas, Utah, then was stationed at Fort Winfield Scott in San Francisco. Late in 1943 he was sent to Los Alamos, where he served as a member of the first MP detachment of the 4817th Unit of the 8th Service Detachment, U.S. Army Corps of Engineers. He was 20 years old when he arrived at Trinity on 30 December 1944. Harris was at Trinity until mid-September 1945. He performed guard duty on foot, on horseback, and in a jeep, and stood guard in the guard towers.

Robert J. Gibson was born in Red Oak, Iowa, on 13 August 1915. He was inducted into the U.S. Army in Des Moines, Iowa, in September 1942, and was sent to the ASTP at the University of Minnesota. The three servicemen in Gibson's company who ranked first academically in the ASTP were given a choice of going to the Massachusetts Institute of Technology or to a special assignment. Gibson was one of the three, all of whom chose the special assignment. They were sent to Oak Ridge, Tennessee, in September 1943. Gibson was there about a year. He performed statistical analysis in the labor-relations office at Oak Ridge, which recruited labor for the Manhattan Project. He requested a transfer and was sent to Los Alamos. In February 1945, about two months after his arrival, he was sent to Trinity. He was 29 years old at the time. Gibson spent a year at Trinity. He remembers only one brief leave, shortly before the atomic test, and one or two errands out of the camp (he went to Socorro on the water truck once). He

was the assistant post engineer (Samuel Davalos was the post engineer, but he was rarely present). Gibson drew the camp map (see Figure 3; note his initials). He was discharged in February 1946.

Robert D. Krohn was born in Milwaukee in 1919. He attended the University of Wisconsin, where there was a program that designed Van de Graaf generators (named for their inventor, physicist Robert J. Van de Graaf) for nuclear studies. Krohn's major professor was H. B. Wallin, who was working for Arthur Compton of the University of Chicago on methods for coating uranium slugs. Krohn worked with Wallin on the project. The leaders at Los Alamos requested the two available Van de Graaf generators and someone who knew how to run them. Krohn went to Los Alamos, where he worked for Joseph L. McKibben. He helped disassemble and remove the generators at the University of Wisconsin (this meant knocking out a wall of the building in which they had been built). The generators were shipped to Los Alamos, where Krohn and a colleague, James Hush, with the help of a construction crew, reassembled them (April 1943). Krohn first went to Trinity in March 1945 to set up instrumentation for the 100-ton test (May 7) and subsequent atomic test (16 July). He was 26 years old. He left Trinity after the May 7 test, returning about the beginning of July, and was at Trinity for the atomic test.

David P. Rudolph served at Trinity Base Camp as the clerk of the Engineer Detail of the 4817th Unit of the 8th Service Detachment, U.S. Army Corps of Engineers, between January and September 1945. He was 24 years old when he arrived at the camp. Rudolph was a native of Chicago and was working for the University of Chicago's Metallurgical Laboratory (a cover name for the Manhattan Project), maintaining inventory control of rare metals, including bismuth and uranium oxide, when he was drafted in August 1943. Wartime secrecy took an odd turn in Rudolph's case. The Laboratory would not tell his draft board the nature of Rudolph's civilian job, but after he was inducted, the director of the Laboratory arranged for him to be requisitioned by the Manhattan Engineer District so that he could continue to work on the project. In January 1945, Rudolph traveled to New Mexico by train, reported at the Bishop Building in Santa Fe, then traveled to Los Alamos, and from there to Trinity Base Camp (his orders show that he went to the base camp in mid-February), where he stayed until September.

Harold H. Smith was born in Clinton, Massachusetts, on 11 September 1920. He was inducted into the U.S. Army in September 1942. Smith arrived at Los Alamos on 3 April 1944, and at Trinity Base Camp in early 1945, when he was 24 years old. Although he was an MP, Smith had also received tank training and went to Trinity as a member of the Engineer Detail rather than as an MP. At the time of the atomic test, he held the rank of Tech Sergeant and was a tank commander. Smith was discharged in 1946, but he returned to Los Alamos as a civilian employee for seven years.

APPENDIX B.

SELECTED ARCHIVAL DOCUMENTS RELATING TO THE ESTABLISHMENT OF TRINITY BASE CAMP PERSONNEL AND EQUIPMENT

ARMY SERVICE FORCES
UNITED STATES ENGINEER OFFICE
P. O. BOX 1539
SANTA FE, NEW MEXICO

IN REPLY REFER TO: EIDM AA

5 January 1946

Subject: Citation for Legion of Merit

To: Captain Howard C. Bush
Special Service Detachment
P.O. Box 632
Socorro, New Mexico

1. Attached are six certified true copies of Citation for Legion of Merit for your information and personal files.

2. The original of this Citation from the Adjutant General's Office has been placed in your 201 file.

FOR THE COMMANDING OFFICER:

R. B. MILLER
Major, C.E.
Executive Officer

1 Incl - (in sext)
Citation for Legion of Merit

CITATION FOR LEGION OF MERIT

First Lieutenant Howard C. Bush, Corps of Military Police, served as a Special Unit Commander of the Military Police Detachment at the Los Alamos Post, Manhattan Engineer District, from December 1944 to August 1945. In order to safeguard materials and an area vital to the successful testing of the Atomic Bomb, his unit was required to remain on duty in an isolated location in the heart of the desert for a period of seven months. Living conditions were crude and monotonous, and recreational facilities practically non-existant. Despite the constant presence of these severe handicaps to morale, this officer, by his superb conduct, exceptional example and capable leadership, initiated and maintained throughout the tension and tedium of this trying period an outstanding morale and esprit de corps in his unit. By his expert command of his troops and careful guarding of a vital area, Lieutenant Bush prevented any occurrences which might have impeded the successful testing of the Atomic Bomb. His accomplishments reflect great credit upon himself and the military service.

SEAL

THE ADJUTANT GENERAL'S OFFICE
OFFICIAL COPY
WAR DEPARTMENT

A CERTIFIED TRUE COPY

R. B. MILLER
Major, C.E.

GENERAL ORDERS)
No 86

WAR DEPARTMENT
WASHINGTON 25, D.C., 12 October 1945

E X T R A C T

* * * * *

III... LEGION OF MERIT.— By direction of the President, under the provisions of the act of Congress approved 20 July 1942 (sec.III, WD, Bul.40, 1942) and Executive Order 9260, 29 October 1942 (sec. I, WD, Bul. 54, 1942), the Legion of Merit for exceptionally meritorious conduct in the performance of outstanding services during the periods indicated was awarded by the War Department to the following-named officers, chief warrant officer, and enlisted men:

First Lieutenant RICHARD C. BUSH, 01796573, Corps of Military Police, Army of the United States. December 1944 to August 1945.

* * * * *

Official:
EDWARD F. WITSELL
Major General
Acting The Adjutant General

G. C. MARSHALL
CHIEF OF STAFF

THIS IS A CERTIFIED TRUE COPY:

Joseph F. Vollmer
JOSEPH F. VOLLMER
1st Lt., C. M. P.
Personnel Adjutant

SAVE

WAR DEPARTMENT
P. O. Box 2610
WASHINGTON, D. C.

REFER TO FILE No. _____

FOR VICTORY BUY WAR BONDS

21 July 1945

2nd Lieutenant Howard M. Bush,
U. S. Engineer Office,
P. O. Box 559,
Berkeley, California.

My dear Lieutenant Bush:

I want to express my appreciation of your exceptional performance in making preliminary arrangements for and in carrying out the guarding and safety aspects of the Trinity Test on 16 July 1945.

You were tireless in your efforts to see that nothing was left undone which would in any way detract from the highly important part of the work assigned to your care. From all sides there was commendation of the thoroughness of your arrangements and the excellence of your performance.

I desire that this letter be made a matter of record in your personal file in the War Department.

Sincerely yours,

L. R. GROVES,
Major General, U.S.A.

HEADQUARTERS CAMP WOLTERS

Auth: Ltr Ho 8'SC

Initials:

Date: Apr 5, 1943

Camp Wolters, Texas,
Apr 11, 1943.

SO No 90)

E X T R A C T

* * * *

3. The following named EM, Provisional Det No 1 (ASF) Camp Wolters Tex are trfd in gr to Santa Fe, N Mex and will proceed Apr 13 1943 to Santa Fe, N Mex reporting upon arrival thereat to COL J M HARMAN CE, Room No 8, Bishop Bldg, Santa Fe N Mex for instructions. EM were trfd to this sta pursuant to par 2 SO No 86 Hq MP Repl Tng Cen, Ft Riley Kans dated Apr 8 1943 and par 1 SO No 48 Hq Sig C Sch Det Civ Vocational Sch, Port Arthur Tex dated Apr 8 1943.

NAME	GRADE	ASN	MOS
	HEADQUARTERS		
HAROLD C MILLIKEN	1ST SGT	6544559	585
JOSEPH A SEDLACEK	CPL	17051487	812
WILLIAM S EWEN	TECH 5GR	35332939	055
JOHN A WHITE	TECH 5GR	33206065	824
WILLIAM R BELL	PVT	32791088	213
HOWARD L DOWDY	PVT	34578048	677
WALTER J DUDEK	PVT	36717971	677
FRANCIS J EDER	PVT	32685380	060
PAUL H EDDY	PVT	35746298	677
MARVIN B LUTZOW	PVT	39405256	677
MAURICE (NONE) GOLD	PVT	32792843	677
JOE E HALIFAX	PVT	38216993	055
DEAN L HOLMAN	PVT	36294342	677
ROY L HOWARD	PVT	38393352	677 (060)
TOLLIE D McMILLEN	PVT	38424224	345
BOURGEOIS J MILLET	PVT	38376307	677
JOHN R MORGAN	PVT	33536566	677
CHARLES F RAHMILLER	PVT	37651964	677
ALFRED J ROSENFELD	PVT	32685275	677
AUBREY P ROBINSON	PVT	34585209	677
FREDERICK J ROACH	PVT	32674172	677
WILLIAM A STILLWAGGON	PVT	32686036	677
JAMES P SYTSMA	PVT	36409715	677
	1ST PLATOON, MOUNTED		
ELWOOD E McCUNE	SGT	35477628	651
PAUL L CLARK	PVT	35746156	677
STUART L JOHNSON	PVT	36717875	677
FLOYD D MILLER	PVT	35746265	677
OLIVER R LEVITT	PVT	36552254	677
JAMES P MAHONEY	PVT	39405540	677
JAY L JOLLEY	PVT	39905119	677
NORMAN H LAYTON	PVT	33389637	677
CHARLES E PLONT	PVT	33494527	677
WILLIAM F MEYERS	PVT	32600107	677

(OVER)

GEORGE A SAUNDERS	PVT	39034961	677
GEORGE (NONE) HEGER	PVT	36552116	677
JOHN S KERMES	PVT	33412955	677
ROBERT W MITRO	PVT	33405727	677
LUDWIG W GREYSHOCK	PVT	33412968	677
RICHARD C COLEMAN	PVT	33527801	677
NORMAN F PARKS	PVT	37491242	677
WALTER (NONE) ROBAKIEWICZ	PVT	36552098	677
ELLIS A RYAN	PVT	38424239	677
FLOYD P VANNOY	PVT	37491667	677
WILMER C SADLER	PVT	37242611	677
DOMINICK R MARINO	PVT	32685683	677
JOHN F SCHAFNITZ	PVT	36552428	677
JOHN M SCHERER	PVT	33519297	345
EDWARD J STARKOWICZ	PVT	33405714	677
CARLO L SILVERI	PVT	32681001	677
HAROLD (NONE) SIMON	PVT	32685535	677
CARL E DIRKSEN	PVT	37543845	677
JACK D WHITE	PVT	34577945	677
EDWARD (NONE) TARNACKI	PVT	36552060	345
STEVE F VAVREK	PVT	33412936	677
ROBERT P LOWE	PVT	32667360	677
JOSEPH A NOSSEK	PVT	33405813	677
CLIFFORD A McGINTY	PVT	39904993	677
ELBERT G HENDRIX	PVT	34585492	677
	2ND PLATOON, MOUNTED		
WILLIAM H BEAR	CPL	19020022	652 (653)
WINIFRED (NONE) COMSTOCK	CPL	34313664	653
HUGH M SEELEY	PVT	39905034	677
GEORGE J EDWARDS	PVT	32583836	094
JOHN (NONE) LOWERY	PVT	6860436	060 (622)
THOMAS H COWLEY	PVT	34585454	677
MARVIN R DAVIS	PVT	36439964	677
WILBUR F RUHLOW	PVT	36010936	697 (235)
LOUIS P COWLES	PVT	39905382	677
WILLIAM P MASTERSON	PVT	32686103	677
HERBERT L GARRETT	PVT	34578036	677
HARLEY W DEPPE	PVT	36290414	677
HARVEL O ENOS	PVT	37651951	677
RONALD E W FOLEY	PVT	31265329	677
JOSEPH E FINNERAN	PVT	32685875	677
EDWIN (NONE) HANSEN	PVT	32600249	677
ROY C DeHART	PVT	33527876	677
FREDERICK W GALBRAITH JR	PVT	32685686	677
JAMES C MURKS	PVT	34585379	677
ANGELO J DiBELLO	PVT	32685480	677
JAMES E HILLS	PVT	37651927	677
BYRON B SHULL	PVT	39904954	677
LEO F HENGSTENBERG	PVT	32685708	677
MICHAEL (NONE) WASKO	PVT	33485199	677
JOHN F POWERS	PVT	38409943	677
THOMAS A SHEEHAN JR	PVT	32685230	677
ALVIN F GERMAN	PVT	36439962	677
HAROLD J SMITH	PVT	32685818	677

Par 3 SO No 90 Hq Camp Wolters Tex 4-11-43 cont'd.

JOSEPH L WEBER	PVT	37467304	677
WILLIAM E WILLOCK	PVT	32685729	677
JOHN W WICKLUND	PVT	36718040	677
GRAFTON E SOOY	PVT	32484548	677
CLARENCE C SIMPSON	PVT	33405637	677
RUSSELL P PALMER JR	PVT	34584884	677
JOHN A ROY	PVT	38376222	677
	SIGNAL MEN		
CHARLES J BUSHAKRA	TECHN 5GR	37242210	766
SAMUEL D GROSS	TECHN 5GR	37446677	766
JOHN A LOPEZ	TECHN 5GR	39545810	766
LEON A GILBREATH	TECHN 5GR	17082940	766
REXFORD L COON	TECHN 5GR	18209638	766
WILLARD W SHERMAN	TECHN 5GR	37243805	766
EDWARD (NONE) KLEIN	PVT	1411828	677

TC will furnish the necessary T. The Tn Comdr named in par 30 SO No 82 Hq IRTC Camp Wolters Tex dated Apr 6 1943 will draw necessary rat in kind for the above named EM for 3 meals each in traveling fr Camp Wolters Tex to Belen, N Mex. QM will furnish 1 party meal ticket for 100 men for 1 meal for rat fr Belen N Mex to Santa Fe, N Mex. TDN. FD 33 P 433-02 A 0425-23. Auth: Secret Ltr Hq 8'SC file AG 370.5 subject: "Provisional Military Police Detachment No. 1" dated Apr 5 1943.

4. Having been asgd to this sta pursuant to par 3 SO No 86 Hq MP Repl Tng Cen, Ft Riley Kans dated Apr 8 1943 CAPT ALBERT L CERNAGHAN 0165967 CMP, 2ND LT JOSEPH F VOLLMER 01797392 CMP and 2ND LT HOWARD C BUSH 01796573 CMP, Provisional Det No 1 (ASF) Camp Wolters Tex, are reld fr asgmt and duty this sta and are asgd to Santa Fe N Mex and will proceed Apr 13 1943 to that sta as Officers in Charge of enl pers named in par 3 SO No 90 this Hq cs. TC will furnish the necessary T. The Tn Comdr named in par 30 SO No 82 Hq IRTC Camp Wolters Tex dated Apr 6 1943 will draw necessary rat in kind for 3 officers for 3 meals each in traveling fr Camp Wolters Tex to Belen, N Mex. TDN. FD 33 P 433-01,02,03,07,08 A 0425-23. Auth: Secret Ltr Hq 8'SC file AG 370.5 subject: "Provisional Military Police Detachment No. 1" dated Apr 5 1943.

* * * *

By order of Colonel FLEGEL:

JAMES A. LEWIS,
Major, Infantry,
Acting Adjutant.

OFFICIAL:

JAMES A. LEWIS,
Major, Infantry,
Acting Adjutant.

DISTRIBUTION:
5 AGO
4 CG 8'SC ASF
3 O Div AG 8'SC ASF
7 TC CWT
4 FO CWT
1 Camp Int O CWT
4 each O
4 Capt Lowe
4 Col J M Harman, Room No 8, Bishop Bldg; Santa Fe N Mex
1 Confidential file

10 October 1944

Subject: Construction and Equipment Requirements for Proposed Test Site, Trinity. A-84-019 54-15

The total cost for construction for a headquarters camp for a maximum of 160 men, and for the preparation of a test site, is $108,400. This figure is based on the organization and requirements given below.

PERSONNEL

The number of personnel who will be located at the test area will vary between a maximum of 160 men down to a minimum of 133. The following groups will be needed:

Security and Safety

Military Police Detachment - - - - - - - - - - - - 45 men.

This number was provided by Major deSilva earlier in September.

Service Personnel

Project Engineer - - - - - - - - - - - - - - - - - -	1 Officer
Medical Officer - - - - - - - - - - - - - - - - - -	1 Officer
Cooks -	4 men
K. P. 's. -	4 men
Mechanics and Vehicle Maintenance - - - - - - - -	6 men
Truck Drivers and Road Equipment Operators - - -	10 men
Medical Orderlies - - - - - - - - - - - - - - - - -	2 men
Crew for miscellaneous construction, maintenance, and repair - - - - - - - - - - - - - - - - - -	15 men

Technical Personnel:

Two SCR-584 operating crews - - - - - - - - - -	20 men
Project Y staff members and SED personnel from Group X-2 and Administrators from Project Y	25 men

At the time of peak activity prior to the test, this group will increase to a maximum of approximately 50 men.

Total -	158 men - Maximum
	133 men - Minimum

HOUSING

Barracks for housing are based on providing accommodations and services for a maximum of 160 men with an average population of approximately 135. CCC portable buildings are available in Albuquerque and have been ear-marked for our use. It is estimated that a period of three weeks will be required to dismantle the buildings at their present location, transport them by truck to the new location, and erect them there. Six (6) buildings are required as follows:

1 - 20'x100' -- 50 men - - - - - - - - - - - - - - - - - - - MP barracks

1 - 20'x100' -- 50 men - - - - - - - - - - - - - - - - - - - SED barracks

1 - 20'x100' -- 50 men - - - - - - - - - - - - - - - - - - - SED and Technical Staff

1 - 20'x60' -- 30 men - - - - - - - - - - - - - - - - - - - Service & Supply.

1 - 20'x100' -- Office, Laboratories and Instrument Maintenance, Officers' Quarters

1 -- 150 men - - - - - - - - - - - - - - - - - - Latrine.

Total cost of dismantling, transportation, and erection of six CCC buildings is approximately $8500.00.

MESS HALL AND SHOPS

1 - 20'x150' -- Mess Hall and Kitchen.

1 - 20'x50' -- Commissary and QM Supply Warehouse.

1 - 30'x50' -- First and Second Echelon Repair.

1 - 20'x50' -- Warehouse for Technical Supplies and Storage.

These buildings are the CCC portable type available in Albuquerque; cost of erection and transportation about $5100.00.

UTILITIES

Electric

It is proposed to install portable generator sets now available at Site Y to handle the necessary loads for lighting and general utility purposes.

Telephone

Telephone connection to Mountain States Line, 4 miles distant, about $4000.00.

Water

At a Headquarters ranch is a well of sufficient capacity to handle water needs for sanitary uses. The owners state that the output of this well is from 15 to 20 gallons per minute. Water from the well will be pumped into an existing storage tank of about 10,000 gallons capacity. This will afford sufficient pressure for general use. Two

electrically-driven pumps of 20 gallons per minute would be installed at the well. Estimated cost of installation of both water and electric service for Headquarters Site, $3,000.00.

Railroad and Roads

Ground reconnaissance of the area located a railroad siding on the Santa Fe Railroad at a point approximately 35 miles due west of the proposed site. This siding is a long by-pass siding. If the railroad should permit its use for storage and unloading of rail cars, then no additional construction will be needed. Accessibility to this point, as well as ground conditions, is quite satisfactory for transportation of Jumbo. It is believed that all road improvements could be handled with pull grader and road patrol. It is estimated that approximately ten miles of this access road pass over private property and the Security office must determine if there are any legal questions involved in order to travel through this property.

There are gravel deposits within the area, one equipped with grizzly and loading platform, already opened, which will be used for surfacing materials where needed. In addition to this access road from the railroad station, there are approximately 35 miles of improved road parralleling telephone line from the nearest town which will require minor blading operations for good roadability.

At the test site proper, there are ten miles of existing roads which can be improved by blade and scraper and an additional ten miles of scraping and ditching is needed to provide easy access to the guage stations and recording houses. The ground over which these new roads must go is suitable for simple scraper construction as evidenced by a number of roads of this type which the Air Base has put in for access to their bombing targets and wells. It is estimated that the improvement and construction of the roads above would cost approximately $10,000.00.

SPECIAL STRUCTURES

Bomb Proof and Buildings

1 - Explosives Magazine, 5 ton capacity, 10'x15'x8' high - - - - - - - - $3,500.00.

1 - Cap and Booster Magazine - 500.00

2 - Concrete Instrument chambers for the protection and proper functioning of test recording instruments at $5000 ea. - - - - - 10,000.00.

A drawing of these buildings is attached.

2 - Chambers for recording instruments and personnel, 15'x20'x8' at $8000 ea. - 16,000.00.

2 - Chambers for recording instruments and personnel, 12'x10'x8' at $5000 ea. - 10,000.00.

The construction of these chambers and the ones immediately above is shown on the attached sheet.

1 - Unloading platform at rail head and mounting base and stabilizing guys for Jumbo at Site - - - - - - - - - - - - - - - - 10,000.00.

Platforms (continued)

1 - Timber platform 25'x25'x20' high, to carry 100 tons of high explosives and a ramp from platform to ground - - - - - - - - - - $ 7,000.00.

Two weeks prior to the main test shot, 100 tons of TNT with Comp B as a booster will be shot to obtain data on blast and earth shock for this amount of high explosive, to provide a point intermediate between the expected gadget energy release and the tables prepared from much smaller charges which do not extend beyond 5 tons and, secondly, this will provide a full dress rehearsal to check on the operation of all the guages, the teamwork, and timing of all the crews.

Revetments

2 - Rebetments for SCR-584 radars. One at station "A" and one at station "B" at $1,000.00 ea. - $ 2,000.00.

3 - Revetments for SCR-584 power trailers. Two at station "A" and one at station "B" at $200.00 ea. - 600.00.

2 - Revetments for SCR-299 radio equipment mounted in K-51 trucks at $600.00 ea. - 1,200.00

1 - Revetment for M-10 Truck - 1,000.00

1 - Revetment for K-35 trailer for photographic trailer - - - - - - - - - 1,000.00

Costs for the construction of the special structures and revetments above are made on the basis of experience with similar type structures at Y. It has not been clearly settled at this time as to the manner in which construction will be handled at Trinity. Previous contacts had been made by Major Stevens with the Commanding Officer of a near-by air base. It was suggested that construction would be handled through the Post Engineer at this base either on contract or direct supervision.

The gravel for the concrete is available in deposits within eight miles of the gadget location and larger stone is available at a mine dump one mile further distant.

VEHICLES AND EQUIPMENT

Early in September, Major Stevens and Major deSilva transmitted to your office a list of the vehicles needed for use by the technical staff and by the MP's. A copy of this is appended. Item "d" may be reduced from three to two 15-passenger busses. In addition to the above list, the following equipment is needed for service and supply work at the base camp as well as for general maintenance and miscellaneous construction throughout the entire site:

1 - Tank truck, water, 700 gals, 2½ tons, 6x6, as shown on page 266 of TM 9-2800.

This will be used for transporting drinking water approximately 40 miles from the nearest town. The well water is too alkaline to serve.

1 - Gasoline and oil distributing truck, 750 gallons, 2½ tons, 6x6, F-3, page 254.

3 - Trucks, combination stake and platform, 1½ ton, 4x4, page 200.

3 - Dump Trucks, 1½ ton, 4x4, page 204.

1 - Refrigerator semi-trailer, 5 ton, page 474; with tractor.

1 - Fire truck, brush, 1½ ton, 4x2, Class 300, page 186.

2 - Motor patrols with 12 ft. blade and snow plow attachments.

2 - Dozers, D-7, or equal.

SUMMARY OF CONSTRUCTION COSTS

Housing		$ 8,500.00.
Mess Hall and Shops		5,100.00.
Utilities:	Water and Electricity	3,000.00.
	Telephone	4,000.00.
	Roads	10,000.00.
Special Structures:	Bomb Proof and Buildings	50,000.00.
	Platform	7,000.00.
	Revetments	5,800.00.
Contingencies, miscellaneous construction		15,000.00.
		$108,400.00.

Vehicles for Technical Staff and M. P. 's.

TM 9-2800 Prepared by Major Stevens and Major deSilva and Group X-2.

REF	NO.	Description	As seen on Page
a.	2	4 x 4 1½ T trucks	196
b.	4	6 x 6 2½ T Trucks	242
c.	8	4 x 4 1/2 T Panel trucks	152
e.	4	4 x 4 1/4 T (Jeeps)	136
* d.	3	15 passenger busses	362
e.	1	Ambulance	354
g.	1	Telephone Install. & Maint. Trk. (K50) 3/4 T	170
f.	1	Earth-bores & pole-setter on K-44 trk.	208
h.	1	4 x 4 1/2 T Panel truck	152
i.	5	4 x 4 1/2 T Carry-all	146
j.	4	4 x 4 1/4 T (Jeeps)	136
k.	2	4 x 4 3/4 T Carry-all	164
l.	4	4 x 4 1/2 T Carry-all	146

*Oct. 6, 1944 - Only 2 busses will be required under present plans.

a. For laying apx. 200 mile phone wire - maintaining same - used by 6 men.

b. Transp. of H.E. from nearest rhd (apx. 60 mile round trip) basis: 2 T Truck, 2 rd. trips/day per truck. (6-7 days for req'd 100 T - H. E.).

c. Used by 12 men - install. of instruments, connection of same, trouble shooting, tracing wires, maintenance, etc. (1/man for efficiency over large areas).

d. 2 for regular trips between A and B, all 3 for trips between Trinity and Site, morning and evening.

e. Will attempt to get one from base ?

f. To set poles and maintain poles for guages during test.

g. Maint. of telephone lines, etc.

h. Mobile station for radio sonde equipment.

i. Warning in case of super-activity.

j. 2 for each station, A & B.

k. Changing guard and relief, occasional supply.

l. Patrols.

BB

HEADQUARTERS
SPECIAL SERVICE DETACHMENT
P.O. BOX 632
SOCORRO, N.MEX.

RECEIVED FOR DELIVERY TO SANDIA:

KNIVES	603
SPOONS	618
FORKS	738
TRAYS	528
PIE PANS	7
CAKE PANS	2
SALT-PEPPER SHAKERS	32
GRAVY BOATS	6
PITCHERS	16
RATION PANS (small)	7
RATION PANS (LARGE)	4
GRIDDLE	4
DEEP FRYER	1
BUTTER CUTTER	1
GRINDER	1
CUPS	368
BOWLS	357
PLATES	11
VINEGAR BOTTLES	6
G.I.CANS	9
FRYING PANS	6
COFFEE POTS	6
POTS (10gal.)	3
POTS (15gal.)	3
MIXING BOWL	1
LIDS	6
MIXING LADLES	2
SHEET PANS	7
DISH PANS	6
MIXING BOWL	1
CULLENDER	1
BEDS COMPLETE	44
MATTRESS	74
PILLOW	1

Gabriel Lewis Baker
RECEIVED BY

HH

HEADQUARTERS
SPECIAL SERVICE DETACHMENT
P.O. Box 632, Socorro,
New Mexico

15 March 1946

Received for Delivery to Sandia:

66 Beds, Complete. ✓
1 Box Bolts, Nuts, and T Washers
1 Box of 12 Stove Grates
4 Tent Tarps. ✓
7 6x6 Tarps.
2 Weapons Carrier Tarps.

G H George Corp

HEADQUARTERS
SPECIAL SERVICE DETACHMENT
P.O. Box 632, Socorro,
New Mexico

15 March 1946

RECEIVED FOR DELIVERY TO SANDIA:

QUANITY	DESCRIPTION
1	Dodge Ambulance, AR602-25641, USA 71337
-	Motor No 2II43375.
1	Stretcher (in Ambulance)
1	Refrigeration Truck, Serl No. 826415
-	Model WK62, Motor No. 826415.
1	Trailer Unit, USA No. WO101175, LA36133
-	AEM 1176, ME 1404.
1	GMC 2½ Ton 6x6, W-416041-S., APP.30886,
-	AM 530, K244
1	Two passenger seat for Carry-All
10	Pillows ✓
160	Mattresses ✓

T/4 George Ornet

HEADQUARTERS
SPECIAL SERVICE DETACHMENT
P.O. Box 632, Socorro,
New Mexico

QUANITY	DESCRIPTION
8	Scoop Shovels
7	Folding Chairs
1	Spoon (Long Handle)
1	2 Sleeve 8 Inch Pulleys
1	1 Sleeve 10 Inch Pulleys
2	1 Sleeve 6 Inch Pulleys
1	Century Motor Model CSH67LYBXM2-1E, ✓
-	115-230 Volt, Serial No. Y-12, Unit No. 79093
-	Type 5SR3, VACUZZl Pump.
5	Monkey Wrenches
1	Bolt Cutter, 1-4 Adjustment
2	Hand Axes
3	Pr. Gas Pliers
1	Hand Saw, Rip.
1	3/8 by 1/4 Inch Screw Driver
1	1 1/4 by 1 1/16 End Wrench
1	1 ½ by 1 5/16 inch End Wrench
1	Flat Top Desk, Mahogany ✓
1	Flat Top Desk, Maple ✓
2	Swivel Tupe Chairs ✓
5	Post Hole Augers 12 Inch
4	6 Inch Post Hole Diggers
3	F foot Pinch Bars
3	4½ ft. pinch Bars
5	Grubbing Hoes
1	#1 Scoop Shovel
2	#2 Scoop Shovels
6	Diamond Edge Shovels (flat)
7	D.Handle Spades
10	Axes
3	Post Digger Handles
1	Post Hole Shovel
8	10 lb. Sledge Hammers
4	Pick Axes
2	Pick Maticks
2	Star Wood Picks
3	D. Handles
1	Post Hole Cleaner
3	Long Handle Spades
1	2 Man crosscut saw
1	crow bar
1	12 by 4 Inch Pulley
2	4 Gallon Portable Drinking fountains
2	Bench Stools
2 R	Road Flares
11	Canvas Tops for 6x6's
13	3x9 Foot Wood Sides for 6x6's
4	Back Plates for 6x6's

List continued.

12	Bows For 6x6's
10	Bows for Weapons Carriers
7	Canvass Backs for Weapons Carriers
5	Canvass Backs for M 6x6's
3	3 Man Seats
2	2 Man Seats
1	Drivers Seats.
31	Wood Army Beds, Complete. ✓

Material on pages (1), and (2) were received for Delivery to Sandia.

PEC Paul Shotzberger

HEADQUARTERS
SPECIAL SERVICE DETACHMENT
P.O. BOX 632
SOCORRO, N.MEX.

RECEIVED FOR DELIVERY TO SANDIA:

A.C. SANDBLAST SPARK PLUG CLEANER	1
ELECTRIC MOTOR 1½ H.P. Model B 647 M 129 #2W	1
" " 2 H.P. SERIAL# 2000055	1
FLOOR CHAIN HOIST	1
LINCOLN GREASE GUN HIGH PRESSURE	1
BLOW TORCHES	2
PLUMBERS FURNACE	1
SLEDGE HAMMERS;;	3
VICE	1
BREST DRILLS	2
HACK SAW FRAMES	2
TINSNIPS	1
PIPECUTTER	1
BALPINE HAMMER	5
BLACKSMITH HAMMERS	4
ANVIL ASS	3
ADJUSTING WRENCHES::	6
STILSON WRENCH	1
PIPE WRENCH	1
½" DRIVE SOCKET HANDELS	2
3/8 " " "	1
½" " " " .....SHORT EXTENSION	2
SOCKETS	15
BOX END WRENCHES	9
OPEN BOX END WRENCHES	9
" END "	7
SCREWDRIVERS	19
BLACKHAWK FLOOR JACKS XXXXXXX 1829591	1
" " " 1829593	1
AIR COMPRESSOR UNIT	1
Electric Motor XXX 1915473	
CompresSor " 3048-2402	
Tank	
GRINDER UNIT	1
Stand	1
Motor Serial# 26968	1
Stones	2

R.C. Bowdoin
RECEIVED BY

REPORT OF SURVEY

Stock Record Consolidated Account No. 8-1044

Quartermaster (M/R) Property U. S. Engineer Office, PO Box 1539, Santa Fe, N.M.
(Class of property, ordnance, medical, etc.) (Stock record account and station)

Accountable [redacted] Property Agent - Verlin R. Lefler, Adm. Asst. Date 4 December 1946

STOCK NO.	ARTICLES	QUANTITY	TOTAL COST	DISPOSITION		
				DESTROY	SALVAGE	OTHER
26-B-525	Bedsteads, wood, double decking type	6	$55.08			Lost
	Boots, Mackinaw, medium, pair	1	8.00 est.			"
63-C-1095	Bowls, sugar, w/cover	12	4.92			"
	Cans, gasoline, safety, 5-gal cap.	10	10.50 est.			"
	Clocks, 8 day, "Chelsea" #332284	1	15.00			"
26-C-7400	Comforters, cotton filled	87	254.04			"
	Cupboards, legal	2	20.00 est.			"
64-F-275	Forks, cook, flesh, 15"	1	.14			"
74-G-62-75	Glasses, sun, clip-on type	60	49.80			"
	Kegs, water, 10 gal.	1	3.50 est.			"
64-K-475	Knives, boning, 6" blade	2	.56			"
	Machines, paper fasteners	4	4.04			"
64-M-272	Measures, lipped, 1 qt. cap. (tin)	1	.30			"
64-M-276	Measures, lipped, 1 gal. cap. (tin)	1	.82			"
	Pans, insert, w/cover	1	1.50 est.			"
64-P-960	Pans, pie, tin, 9"	2	.10			"
64-	Pans, sauce, 2 qt., #140	3	1.17			"
55-P-4130	Parkas, pile, large	7	175.00 est			"
55-P-4131	Parkas, pile, medium	5	125.00 est			"

REPORT OF SURVEY

(Class of property, ordnance, medical, etc.) Property (Stock record account and station)

Accountable officer Date

STOCK NO.	ARTICLES	QUANTITY	TOTAL COST	DISPOSITION: DESTROY	DISPOSITION: SALVAGE	DISPOSITION: OTHER
27-P-425	Pillows, feather	52	38.48			Lost
63-C-2550	Pitchers, water, 4 qt. (chinaware)	12	10.16			"
63-C-3035	Plates, dinner (chinaware)	5	.95			"
63-C-1320	Shaker, salt, metal, screw cap	7	.28			"
64-S	Steels, butcher, 10"	1	.49			"
	Tanks, mopping portable w/wringer	3	62.16			"
27-T-28625	Towels, huck, white (hand)	44	5.72			"
	Wheelbarrows	1	7.00			"
64-W-190	Whips, ox, 10"	2	.44			"
		Grand total	$855.01			

DATE AND CIRCUMSTANCES

The above listed items of Quartermaster Property were lost and destroyed at Trinity Site, P. O. Box 632, Socorro, New Mexico during the period 4 April to 28 June 1946, while the responsible officer, Captain Howard C. Bush, was assigned to primary duty as Provost Marshall, Sandia Base, P. O. Box 5100, Albuquerque, New Mexico. Additional explanation of circumstances is attached herewith.

Exhibits "A" and "B" attached.

AFFIDAVIT

I do solemnly swear (or affirm) that the articles of public property shown above and/or on attached sheets were lost, destroyed, damaged, or worn out in the manner stated, while in the public service.

Howard C Bush

HOWARD C. BUSH (Signature) Capt., CE
Special Service Detachment
(Grade and organization)

Subscribed and sworn to (or affirmed) before me at Los Alamos, N. M.

this 17th day of Jan 1947

Eugene E Kitzen

EUGENE E KITZEN, Major, SC
Surveying Officer
(Grade and organization or title; if notary public, affix seal)

CERTIFICATE

I certify that the loss, destruction, damage, or unserviceability of the articles of public property shown above, and/or on attached sheets, was caused in the manner stated and without fault or neglect on my part, and that each article listed with a view to elimination by destruction has been examined by me personally, has never been previously condemned, and is, to my opinion, worthless for further public use.

Weldon B. Heller

Weldon B. Heller (Signature) Adm. Asst.
Accountable Property Agent
(Grade and org., accountable or responsible officer)

Hq. .....

Station .....

Date .....

To SO #206/46

who is appointed surveying officer.

By order of .....

.....

.....
Adjutant.

Hq, U S Engr Office
P O Box 1539
Santa Fe, N. Mex.

4 Apr 1947

Approved:

By authority of the
Secretary of War:

H. C. GEE
Colonel, CE
Commanding

Property Voucher No. [illegible]

W. D., A. G. O. Form No. 15
15 October 1943

10—87184-1

FINDINGS.[4]—I have examined all available evidence as shown in exhibits "A" to "B" and as indicated below have personally investigated the same and it is my belief that the articles listed hereon and/or on attached sheets, total cost $ 855.01 were not lost through fault or neglect on the part of Captain Howard C. Bush, CMP, 0-30205, responsible officer.

Certificate of Capt Howard C. Bush, (Exhibit "A") states that he was assigned a second primary duty at Sandia Base as Provost Marshal on 28 March 1946 (see Exhibit "B") and was not given another officer to supervise or take care of his property at Trinity Site until 17 July 1946 when he was relieved as Provost Marshal and returned to Trinity Site.

The undersigned who was stationed at Sandia Base from 17 Feb 1946 to 1 June 1946, has personal knowledge of the fact that Capt Howard C. Bush could not exercise proper control over his property at Trinity Site as the distance from Sandia Base to Trinity Site is approximately one hundred and thirty miles, and Capt Howard C. Bush could go there only about twice a month.

An officer will not, when it can be avoided, be assigned duty that will separate him from public property for which he is accountable or responsible. (see AR 3506520, Par 5 (2) b).

There is no conclusive evidence to show intent to defraud, willful loss, or such a clear disregard of duty to exercise the care necessary to prevent loss as would plainly amount to conscious or reckless indifference to consequences; which are the prerequisites for raising pecuniary liability. (see AR 35-6640, Par 3 (2).)

It is the belief of the undersigned that some of the property on this report of survey is still in Government service, and is a shortage only in accounting.

RECOMMENDATIONS.--That the accountable property agent, Verlin R. Lefler, Adm. Ass't., and the responsible officer, Capt Howard C. Bush, CMP, 0-30205, and all others be relieved from accountability and responsibility.

Ernest R Dixon

ERNES T R DIXON, Capt, CE
Surveying Officer

21 March 1947

I have witnessed the destruction of the articles to be destroyed and/or received the articles to be turned in to salvage.

Date .....

.....
(Officer witnessing destruction, or salvage officer)

[9]	[10]	[11]
Hq. ..... Station ..... Date ..... APPROVED: Any damaged property shown above and/or on attached sheets has been inspected by me, or by a disinterested officer of suitable grade and arm or service, and the disposal indicated is in the best interests of the public service. .... (Appointing authority)	Hq. ..... Reviewed for commanding general of service command. Date ..... Number ..... *Finance officer.*	

[1] If space is inadequate, list articles on suitably ruled and captioned attached sheets and recapitulate in this and Total Cost column as "Sheet 1, $147.00"; "Sheet 2, $254.30," etc.

[2] Estimate cost if not known.

[3] When disposition of articles is involved, the surveying officer will indicate same in proper column using abbreviated entries as follows: D—to be destroyed; S—to be turned in for salvage; C—to be continued in service; Rp—to be repaired.

[4] The grand total cost of all articles acted upon will always be shown.

[5] Enter a concise statement of date and circumstances together with a reference to certificates and affidavits submitted, as "Exhibits A to H herewith." Each exhibit will bear a reference to the report of survey to which it pertains as, "Ex. 'A'—R/S 3/4/34—$75.00."

[6] The certificate may be omitted if the oath is subscribed to by the accountable or responsible officer. In any event the oath must be subscribed to.

[7] For use of chief of arm or service or Secretary of War or both.

[8] Enter total cost as shown on the face of the report and continue with the findings in full. If any oral testimony is considered, the name of each witness and a clear, concise statement of the testimony given will appear in the findings. Opposite a caption "RECOMMENDATIONS", which should follow the findings without loss of space, enter appropriate recommendations. The recommendations should be complete in all details and cover all articles or subjects investigated. If space is insufficient, continue on additional sheets; the station, date, and signature to follow the recommendations in any case.

[9] Should the appointing authority disapprove the recommendations of the surveying officer, the disapproval with reasons or action recommended will be typed on the back of the report or on an attached sheet and reference made thereto in this space.

[10] For action or review of division, post, camp, or station commander if surveying officer is appointed by a subordinate administrative commander.

[11] For use of commanding [illegible]

REPORT OF SURVEY

Stock Record Consolidated Account No. 8-1044

Engineer (M/B) (Class of property, ordnance, medical, etc.) Property U. S. Engineer Office, P O Box 1539, Santa Fe, N. Mex. (Stock record account and station)

Accountable ~~xxxx~~ Property-Agent - Verlin R. Lefler, Adm. Asst Date 4 December 1946

STOCK NO.	ARTICLES	QUANTITY	TOTAL COST	DISPOSITION: DESTROY	DISPOSITION: SALVAGE	DISPOSITION: OTHER
	Pumps, centrifugal, Jacuzzi type #79093	1	$70.50			See Date and Circumstances No. 5
	Vises, pipe	1	9.90			
	Wrenches, pipe, 36"	1	16.00			
	Wrenches, tension	1	10.56			
		Grand total	$106.96			

DATE AND CIRCUMSTANCES

The above listed items of Engineer Property were shipped to the U. S. Engrs. Sandia Base, P. O. Box 5100, Albuquerque, N. Mex., from Trinity Site, P.O. Box 632, Socorro, New Mexico, during the period 28 March to 28 April 1946 in accordance with verbal instructions issued by Commanding Officer, Lt. Col. A. J. Frolich, Receipts were obtained from the Sandia representative who picked up the property and true copies of which are attached herewith ~~xxExhibit~~ "A", and "B" attached.

AFFIDAVIT

I do solemnly swear (or affirm) that the articles of public property shown above and/or on attached sheets were lost, destroyed, damaged, or worn out in the manner stated, while in the public service.

Howard C. Bush

HOWARD C. (SIGN) BUSH, Capt, CE
Special Service Det.
(Grade and organization)

Subscribed and sworn to (or affirmed) before me at Los Alamos, N. M.

this 17th day of Jan, 1947

Cuggie E. Kyzer

CUGGIE E KYZER, Major, SC
Surveying Officer
(Grade and organization or title; if notary public, affix seal)

CERTIFICATE

I CERTIFY that the loss, destruction, damage, or unserviceability of the articles of public property shown above, and/or on attached sheets, was caused in the manner stated and without fault or neglect on my part, and that each article listed with a view to elimination by destruction has been examined by me personally, has never been previously condemned, and is, in my opinion, worthless for further public use.

Verlin R. Lefler

Verlin R. (SIGN) Lefler, Adm Asst
Accountable Property Agent
(Grade and org., accountable or responsible officer)

Hq. ____

Station ____

Date ____

To SO #206/46
SO #21/47

who is appointed surveying officer.

By order of ____

____
Adjutant.

(1) Hq, U S Engr Office
P O Box 1539,
Santa Fe, N. Mex.

4 Apr 1947

Approved:

By authority of the Secretary of WAR:

H. C. Gee
H. C. GEE
Colonel, CE
Commanding

Property Voucher No. Eng-I-4930-47

W. D., A. G. O. Form No. 15*
15 October 1943

16—87184-1

*This Form supersedes W. D., A. G. O. Form No. 15, 15 July 1935, which may be used until existing stocks are exhausted.

FINDINGS.[8]—I have examined all available evidence as shown in exhibits "A" to "B" and as indicated below have personally investigated the same and it is my belief that the articles listed hereon and/or on attached sheets, total cost $ 106.96 were not lost through fault or neglect on the part of Capt Howard C. Bush, CMP, O-30205.

Certificate of Capt Howard C. Bush (see Exhibit "A") states that on verbal orders of the commanding officer of Sandia Base, Lt Col Proclich, all surplus property at Trinity site was shipped to Sandia Base.

Transportation was sent to Trinity Site to pick up the property but no representative of the Supply Section of Sandia Base was at Trinity Site to count and sign for the property. Capt Bush then had the property loaded on the trucks and obtained the driver's signature for each load (see Exhibit "B").

From personal investigation it would found that the property was stored in the warehouse at Sandia Base and on or about 5 May 1946 the warehouse was reported broken into and some property was missing.

Upon further investigation it was found that the property was on memorandum receipt to Trinity Site from Los Alamos when the property was moved to Sandia Base. Los Alamos Property Officer sent a shipping ticket to the property officer at Sandia Base who refused to sign the shipping ticket as some of the property was missing.

Further investigation and questioning of personnel at Sandia Base disclosed that Capt Howard C. Bush did try to get a credit for the property but the supply office at Sandia Base would not issue a credit until the shipping ticket was cleared up. To this date the shipping ticket has not been signed.

There is no conclusive evidence to show intent to defraud, willful loss, or such a clear disregard of duty to exercise the care necessary to prevent loss as would plainly amount to conscious or reckless indifference to consequences; which are the prerequisites for raising pecuniary liability (see AR 35-6640, Par 3(2))

It is the belief of the undersigned that some of the property on this Report of Survey is still in Government service, and is a shortage only in accounting.

RECOMMENDATIONS.--That the accountable property agent, Verlin R. Lefler, Adm. Ass't, responsible officer, Capt Howard C. Bush, CMP, O-30205, and all others be relieved of accountability and responsibility.

Ernest R Dixon

ERNEST R DIXON
Capt, CE
Surveying Officer

21 March 1947

[1] If space is inadequate, list articles on suitably ruled and captioned attached sheets and recapitulate in this and Total Cost column as "Sheet 1, $147.60"; "Sheet 2, $254.30," etc.

[2] Estimate cost if not known.

[3] When disposition of articles is involved, the surveying officer will indicate same in proper column using abbreviated entries as follows: D—to be destroyed; S—to be turned in for salvage; C—to be continued in service; Rp—to be repaired.

[4] The grand total cost of all articles acted upon will always be shown.

[5] Enter a concise statement of date and circumstances together with a reference to certificates and affidavits submitted, as "Exhibits A to H herewith." Each exhibit will bear a reference to the report of survey to which it pertains as, "Ex. 'A'—R/S 3/4/34—$75.00."

[6] The certificate may be omitted if the oath is subscribed to by the accountable or responsible officer. In any event the oath must be subscribed to.

[7] For use of chief of arm or service or Secretary of War or both.

[8] Enter total cost as shown on the face of the report and continue with the findings in full. If any oral testimony is considered, the name of each witness and a clear, concise statement of the testimony given will appear in the findings. Opposite a caption "RECOMMENDATIONS", which should follow the findings without loss of space, enter appropriate recommendations. The recommendations should be complete in all details and cover all articles or subjects investigated. If space is insufficient, continue on additional sheets; the station, date, and signature to follow the recommendations in any case.

[9] Should the appointing authority disapprove the recommendations of the surveying officer, the disapproval with reasons or action recommended will be typed on the back of the report or on an attached sheet and reference made thereto in this space.

[10] For action or review of division, post, camp, or station commander if surveying officer is appointed by a subordinate administrative commander.

[11] For use of commanding [illegible]ral of service command.

16 J7154-1 ☆ U. S. GOVERNMENT PRINTING OFFICE : 1946

REPORT OF SURVEY

Stock Record Consolidated Account No. 8-1044

Quartermaster (M/R) Property U S Engineer Office, P O Box 1539, Santa Fe, N.M.
(Class of property, ordnance, medical, etc.) (Stock record account and station)

Accountable officer Property Agent - Verlin R. Lefler, Adm Asst to 31 Dec 1946

STOCK NO.	ARTICLES	QUANTITY	TOTAL COST	DISPOSITION: DESTROY	DISPOSITION: SALVAGE	DISPOSITION: OTHER
	Compressors, refrigerator "Brunner" No. 14136	1	$ 75.00			See Date and Circumstances No. 5
64-C-1420	Cups, coffee, unhandled	226	40.68			
63- F-1500	Forks, table	177	30.09			
63-K-2000	Knives, table, grille	211	54.86			
27-M-760	Mattresses, G. I.	46	289.80			
	Pans, dish, 12 qt	4	3.40 Est			
27-P-425	Pillows, feather	11	8.14			
63-G-1320	Shaker, salt, metal, screw cap	32	1.06			
63-S-5080	Spoons, tea regular	110	16.50			
	Tents, pyramidal, less pins and poles	2	350.00			
64-T-480	Trays, serving, mess, 6 comp.	50	51.50			
			Grand total $	$ 921.03		

DATE AND CIRCUMSTANCES

The above listed items of Quartermaster Property were shipped to the U. S. Engrs., Sandia Base, P O Box 5100, Albuquerque, N. Mex, from Trinity Site P O Box 632, Socorro, N. Mex during the period 28 March to 28 April 1946 in accordance with verbal instructions issued by Commanding Officer, Lt. Col. A. J. Frolich. Receipts were obtained from the Sandia representative who picked up the property and true copies of which are attached herewith as Exhibits "A" and "B" attached.

AFFIDAVIT

I do solemnly swear (or affirm) that the articles of public property shown above and/or on attached sheets were lost, destroyed, damaged, or worn out in the manner stated, while in the public service.

Howard C Bush
HOWARD C. BUSH, Capt, CE
Special Service Det.
(Rank, branch of service, organization)

Subscribed and sworn to (or affirmed) before me at Los Alamos, N. M.

this 17th day of Jan, 19 47

Cuggie E Kyzer
CUGGIE E KYZER, Major, SC
Surveying Officer
(Grade and organization or title; if notary public, affix seal)

CERTIFICATE

I CERTIFY that the loss, destruction, damage, or unserviceability of the articles of public property shown above, and/or on attached sheets, was caused in the manner stated and without fault or neglect on my part, and that each article listed with a view to elimination by destruction has been examined by me personally, has never been previously condemned, and is, in my opinion, worthless for further public use.

Verlin R. Lefler
Verlin R. Lefler, Adm Asst
Accountable Property Agent
(Grade and org., accountable or responsible officer)

Hq. _____
Station _____
Date _____
To SO #206/46
SO #21/47
who is appointed surveying officer.
By order of _____

_____
Adjutant.

(To) Hq, U S Engr Office
P O Box 1539
Santa Fe, New Mexico

4 Apr 1947

Approved:

By authority of the Secretary of War:

H. C. GEE
Colonel, CE
Commanding

Property Voucher No. QM-I-6820

W. D., A. G. O. Form No. 15*
15 October 1943

*This Form supersedes W. D., A. G. O. Form No. 15, 15 July 1935, which may be used until existing stocks are exhausted.

16—37164-1

FINDINGS.[4]—I have examined all available evidence as shown in exhibits "A" to "B" and as indicated below have personally investigated the same and it is my belief that the articles listed hereon and/or on attached sheets[1] total cost $ 921.03 were not lost trhough fault or neglect on the part of Capt Howard C. Bush, CMP, O-30205.

Certificate of Capt Howard C. Bush (see Exhibit "A") states that on verbal orders of the commanding officer of Sandia Base, Lt Col Frolich, all surplus property at Trinity Site was shipped to Sandia Base.

Transportation was sent to Trinity Site to pick up the property but no representative of the Supply Section of Sandia Base was at Trinity Site to count and sign for the property. Capt Bush then had the property loaded on the trucks and obtained the driver's signature for each load (see Exhibit "B").

From personal investigation it was found that the property was stored in one of the warehouses at Sandia Base and on or about 5 May 1946 the warehouse was reported broken into and some property was missing.

Upon further investigation it was found that the property was on memorandum receipt to Trinity Site from Los Alamos when the property was moved to Sandia Base. Los Alamos Property Officer sent a shipping ticket to the property officer at Sandia Base who refused to sign the shipping ticket as some of the property was missing.

Further investigation and questioning of personnel at Sandia Base disclosed that Capt Howard C. Bush did try to get a credit for the property but the supply office at Sandia Base would not issue a credit until the shipping ticket was cleared up. To this date the shipping ticket has not been signed.

There is no conclusive evidence to show intent to defraud, willful loss, or such a clear disregard of duty to exercise the care necessary to prevent loss as would plainly amount to conscious or reckless indifference to consequences; which are the prerequisites for raising pecuniary liability (see AR 35-6640, Par 3 (2)).

It is the belief of the undersigned that some of the property on this Report of Survey is still in Government service, and is a shortage only in accounting.

RECOMMENDATIONS.--That the accountable property agent, Verlin R. Lefler, Adm, Ass't; responsible officer, Capt Howard C. Bush CMP, O-30205; and all others be relieved of accountability and responsibility.

Ernest R Dixon
ERNEST R DIXON
Captain, CE
Surveying Officer

21 March 1947

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[2] Estimate cost if not known.

[3] When disposition of articles is involved, the surveying officer will indicate same in proper column using abbreviated entries as follows: D—to be destroyed; S—to be turned in for salvage; C—to be continued in service; Rp—to be repaired.

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[9] For action or review of division, post, camp, or station commander if surveying officer is appointed by a subordinate administrative commander.

[10] For use of commanding general of service command.