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A HISTORY OF LOS ALAMOS, NEW MEXICO

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Abstract—Los Alamos is generally perceived as a modern community devoted to the high technology of the future. In fact it has a human history as colorful as its geological history, dating back to the 12th to 13th centuries. The history of the following periods are highlighted: Keres/Tewa Indian, Spanish Land Grant Settlers and Homesteaders, the Arrival of Anglo Settlers, the Los Alamos Ranch School, Manhattan District of the Second World War, and the Postwar National Laboratory. Chambers is responsible for all sections of this paper except that on the Los Alamos Ranch School, which is by Linda Aldrich.

THE SETTING

The modern community of Los Alamos was born during the Second World War in secrecy and isolation to compete with Germany for technological superiority with which to win the war. War, secrecy, isolation and technological advancement had marked the area's earlier history, but change has been sparked by clashes between people who held different values or by ecological imbalance.

The isolation of the 1.5 mi high city from the surrounding area is due to its geological formation by volcanic eruptions from what is known today as the Valles Caldera, many millennia ago. Successive layers of basalt, andesite, dacite, quartz latite and rhyolite spewed forth over earlier igneous, metamorphic and sedimentary rocks, creating a spectacular plateau shield several hundred feet below the crest of the Sierra de los Valles on the eastern side of the caldera. Unceasing erosion has cut deep canyons through the plateau called Pajarito (Little Bird), exposing on the canyon walls facing south a full palette of earth colors.

The Rio Grande flowing south through central New Mexico has cut a deep moat through the basalt cliffs of the southern portion of this Pajarito Plateau where the community and laboratory of today are situated. Here a white-water stretch of the river flows through White Rock Canyon, which effectively cut off direct access to the area until the modern age of transportation.

KERES AND TEWA INDIAN DWELLERS

The story of the first settlers on the Pajarito is shrouded in the secrecy of unrecorded history. These Indian settlers left behind only ruins of their habitations and some artifacts. Archeologists have pieced together a tale of drought, shortened growing seasons, famine, enemy raids, and technological attempts to offset these catastrophes.

The first Indians to arrive on the Plateau were the Keres, coming from Arizona along the Little Colorado River. They came between 1175 and 1250 A.D. and are thought to be the ancestors of those Indians residing at nearby Cochiti, south of Los Alamos, and other Kerean-speaking pueblos farther south and to the west. They built homes of tuff where three or four families might live together or they took advantage of natural caves in the canyon walls to live in comparative isolation from other groups. Such tuff homes ranging from eight to twenty roorns are found all over the plateau, including one in the community center of downtown Los Alamos. Edgar Hewett, who explored the Pajarito Plateau throughout the early third of the 20th century, believed the Keres people were able to engage in agriculture on the mesa tops of the plateau without benefit of irrigation because the late 12th century must have been a period of greater humidity in the climatic cycle of drought and adequate rainfall.

A century later a second migration of Indian people moved onto the Pajarito Plateau introducing another language, Tewa, and new technology, coming from Mesa Verde in Colorado and Chaco Canyon in New Mexico. Tree-ring data reveal that a great drought occurred throughout the Southwest between 1276 and 1299 A.D. Arriving around 1300, the Tewas constructed large community dwellings one to four stories high, with as many as 600 rooms, on top of the mesas, or carved out artificial caves in canyon walls to create multiple cliff-dwellings in contrast to the technically simpler, scattered, small colonies of the earlier Keres settlers. These latter remains can be seen at Bandelier National Monument.

The Tewa pueblos on the Pajarito Plateau appear to have been chosen for defensive purposes to fend off raiding Navajos and Utes, for, if a good water supply had been their only concern, they would have settled along the continuously flowing Rio Grande. The more easily defended narrow mesa tops of the plateau above the great river provided them with an unobstructed view of the distant landscape. Still, the Tsirege pueblo had a barricade-like wall running from the southwest corner of the main pueblo building to the edge of the canyon wall, a distance of approximately 150 ft, which protected the U-shaped courtyard from a sneak attack from the west. As a precaution against future drought, the Tewas built their communal villages near natural springs and constructed reservoirs to impound communal water supplies. Legend and oral tradition of San Ildefonso and Santa Clara pueblos say that drought and marauding Indians forced their ancestors to leave the plateau. Within 50 years of their arrival, the Tewas did begin to drift away. With less rain, streams disappearing underground and springs drying up, the corn withered. Each year there was less to eat and less seed to store for the next spring's planting. Slowly the plateau's communal life deteriorated. Indian legend says that Awanyu, the plumed serpent water god, had left his home with the Cloud People from where he had sent the rain to join the Star People as the Milky Way.

Today archeologists believe the primary reason the people had to leave the Pajarito Plateau was a drop in the annual average temperature. This climatic variation shortened the growing season preventing the maturation of corn, the Indian's major food. It is conceivable that a smaller food crop, a diminishing water supply, and a corresponding overpopulation created an ecological imbalance. Still the evacuation was gradual.

By 1550 the Pajaritans had completely abandoned their plateau sites for pueblos at a lower elevation along the Rio Grande where irrigation was easier and the growing season longer, although they would continue returning to the plateau to hunt and to worship.

SPANISH LAND GRANT SETTLERS AND HOMESTEADERS

In the mid-16th century, the Spanish Conquistadors, searching for the fabled Seven Cities of Cíbola, began to explore the valley of the great river. While the explorers did visit the Rio Grande Indian pueblos and may well have been at San Ildefonso, just north of White Rock Canyon, they appear to have chosen to follow river beds as the most dependable highways through uncharted land. If the Conquistadors raised their eyes to the fortress-like area of the Pajarito Plateau to note the setting sun's play of shadow on the mesas and mountain peaks, there is no reference in their chronicles of their footsteps nor of their horses following their line of vision. Even when the first settlers came to the area with Juan de Oñate, they chose the Rio Grande's alluvial plain and the valleys of its eastern tributaries as more productive land than the forbidding cliffs of lava and tuff that bordered the western shore of the great river.

The impetus for the Spanish settlement of New Mexico was primarily defensive, to protect Spain's wealth in Mexico, first from the English and later from the French. Reports of numerous Indians to be converted gave the church reason to press for settlement. However, it was not until 1583 that King Philip II of Spain issued a cédula authorizing the conquest of New Mexico. He was influenced by his study of the report (Relation) of the Chamuscado-Rodríguez expedition, which said that colonization could be successful because the Indians were friendly, skilled craftsmen, living a settled, communal life with reasonable customs and able to pay tribute in agricultural surplus.

It was not until 1742 that any Spaniard decided to challenge the Indians of San Ildefonso for occupancy of the Pajarito Plateau. In 1742 Pedro

Sánchez of Santa Cruz, whose mother had been killed by San Ildefonsians, appears to have forged documents to acquire a land grant on the Pajarito Plateau. In his petition for land Sánchez explained his inability to support a family of twenty including his wife, twelve children, three orphan nephews, and three servants on the small piece of land he had acquired through purchase. Although he borrowed land from his neighbors each year to expand his crops, he was still unable to support his family and maintain his sheep, cows and horses. To meet his needs he chose "a piece of land on the other side of the river Del Norte, uncultivated and abandoned," and "unoccupied, there being no one having any claim thereto." Still he recognized that the northern boundary of the land he sought abutted on that "enjoyed by right, by the Indians of the Pueblo of San Ildefonso." Although the Indians could not produce documents to prove their claim, they insisted the Sánchez grant encroached upon their grazing common. For a century and a half the boundaries of this grant would be contested. By then the land was in Anglo hands.

In 1765, Governor Cachupin of New Mexico ordered the designation of the "abandoned ranch property of Pedro Sánchez to the Pueblo of San Ildefonso." This should have meant that the grant had passed out of existence, but after the United States occupation of New Mexico the grant revived in 1851 under the name of Rámon Vigil grant. On August 28, 1851 Antonio Sánchez, claiming to be a descendent of Pedro's son Francisco and Rámon Vigil appeared before the Alcalde for the San Ildefonso jurisdiction. There Sánchez conveyed to Rámon Vigil "the right to eight interests" in the grant from the "Abrevadero del Rio de Los Guajes to the hill of the Rito de los Frijoles," excepting the interests of three heirs. The price of the land was "a yoke of oxen, thirty-six ewes, and one ram", plus "twenty dollars cash." Nothing was done to clarify property ownership in New Mexico before the arrival of the first United States Surveyor-General in December 1854. Therefore, Rámon Vigil, represented by Territorial Supreme Court Associate Justice J. S. Watts, petitioned Surveyor-General William Pelham for "a good title" to his grant. The petition indicated that copies of the 1749 and 1851 deeds were enclosed. However, they were not. Still having had the foresight to have an associate justice of the Territorial Supreme Court represent him, Vigil managed to secure in 1860 from the surveyor-general a clear title to the grant in the name of "the legal representatives of Pedro Sánchez" with Congressional approval. Thus the Sánchez forgeries and the unseen questionable deed of sale to Vigil were accepted as authentic by the United States Government. Despite Pelham choosing to authenticate the grant of the legal representatives of Pedro Sánchez, the Sánchez name disappeared from the grant. Henceforth, the Sánchez land was known as the Rámon Vigil Grant and is so labeled on maps of Los Alamos County today.

Nineteen years later Vigil sold out to Padre Tomas de Aquina Hayes, part Anglo, part Spanish, for $4000. Perhaps Vigil had suffered too many Indian raids. While he had built a house on the grant, his wife, like Pedro Sánchez' wife, chose to remain in comfort and safety in Española. Hayes, whose name appears in English on land office records, sold the land within a month for $16,000 and left the country, but upon his return repurchased the grant for his sale price. Five years after his initial purchase, Hayes sold the grant once more but this time for $100,000, a 650% profit! This sale went to Winfield Smith of Milwaukee and Edward P. Sheldon of Cleveland. With their purchase, the Vigil grant passed permanently into Anglo hands.

By this time a new technology in transportation had brought the next major change to the area. By February 9, 1880, the Atcheson, Topeka, and Santa Fé Railroad had reached New Mexico's capital city by a spur from the main line at Lamy, 18 mi southwest. Anglo-Americans began to pour into New Mexico in search of health, land and wealth. Then on January 8, 1887, the "Chili" line, so named for the produce it carried, united Santa Fé and Denver by skirting the edge of the Pajarito Plateau and crossing the Rio Grande at the north end of White Rock Canyon. Soon cattlemen from Texas and lumbermen from many places used the new means of transportation to New Mexico in their search for profit. In doing so they began to break down the isolation of the plateau.

ANGLO-AMERICAN SETTLERSAND THE HOMESTEADERS

The coming of the railroad made it imperative that the surveyor-general survey the townships that encompassed the Pajarito Plateau. Having done so, the land to the north and west of the Rámon Vigil Grant was then opened up for homesteading. Several Hispanos who had run cattle on the grant, staked out 160 acre farms. For the most part they built one-room log cabins, such as the Romero cabin in the Los Alamos community center near the ancient pueblo ruins, to "prove up" their claims. These cabins were used as summer homes when the Hispanos brought their animals up from the valley to graze on the plateau's greener grass and to enjoy the cooler climate. Many of these homesteads were located on the mesa tops that form today's Los Alamos community and laboratory sites. The homesteads were lost when the Federal government exercised the right of eminent domain for the Manhattan Project. Most owners received some payment but some received none for they had failed to make the 85-mi trek to Bernalillo and Sandoval County's courthouse to pay their annual property taxes. The taxes owed were subtracted from the payments.

Meanwhile, the Vigil grant passed through several Anglo hands, leaseholders as well as owners. The grant was again in court when lumberman Buckman appeared to be making a profit on the grant. A group of Spanish settlers claimed to be descendants of Francisco Sánchez and stated that they were the heirs of the 3/11th interest in the grant that was excepted from Vigil's purchase from Antonio Sánchez. The case dragged on into the twentieth century when the judge ruled in favor of Smith and his new partner Fletcher. The judge ruled that the inheritance was "of a hearsay nature." He was obviously swayed by the fact that Smith and Fletcher had consistently paid the taxes on the land. With more and more homesteaders clearing their land, the lumber operation on the Rámon Vigil Grant looked more profitable to the bigger operators. By 1908 the Rámon Land and Lumber Company had negotiated a contract with Smith and Fletcher to not only cut timber but also to purchase the grant. Within two years the lumber company had paid only a third of the purchase price, $150,000, and was in debt to various creditors. Once again the grant was in court. The next purchaser was Ashley Pond of Detroit, who envisioned a private recreation club for prominent men of the new automobile industry. Incongruously, the Pajarito Club was to have both a game preserve and "happy hunting." Pond later sold out to Frank Bond, who owned the Valle Grande, when the spring in Pajarito Canyon went dry as it had for the Tewa Indians at Tsirege centuries ago. Bond wanted the grant to use as a way station as he moved his large herd of cattle up the mountain and down to the valley with the seasons, as the subsistence Spanish homesteaders did with their much smaller numbers of cattle.

Anglos filed to homesteads also. Four developed into significant ranches. One owner was James Loomis, a Cherokee, whom Buckman hired as "ranger" to keep the native grazers out of the Rámon Vigil Grant when he was cutting lumber on the grant. While Loomis owned the property, it was known as "The Buckman Place." Later it became known as "Anchor Ranch." In the twenties and thirties it was managed by Francis Smithwick for the A. M. Ross estate, which was the owner at the time the Federal government condemned the land for the Manhattan District. This ranch was one of the more extensive enterprises on the plateau. The other three homesteaders filed on land contiguous to each other on Los Alamos Mesa, thus creating the second major ranch on the plateau, known as the Los Alamos Ranch. These homesteaders were Harold Hemmingway Brook, a former Illinois newspaperman who came West seeking a cure for tuberculosis; Markwood Hopper, a partner of Brook's; and Brook's mother, Martha Brook. Brook had served as superintendent of the Rámon Land and Lumber Company and as Pajarito Club manager for Ashley Pond. But he preferred working his ranch. A born experimenter, Brook took on the challenge of dry farming in an area of little rainfall. He employed the people of the valley at harvest time. He acquired the first twine binder used in northern New Mexico and put together one of the earliest steam boiler threshers used on the Pajarito Plateau. He sold his Los Alamos Ranch to Ashley Pond and joined the newly established agricultural extension service as county agent for Doña Ana County to teach other farmers the techniques he had perfected at Los Alamos.

Ashley Pond, frustrated in his dream for a dude ranch, turned to an earlier dream to establish an exclusive boys school, where youngsters suffering ill health due to polluted urban environments might regain their vigor in New Mexico's clear atmosphere without having to give up a year's education. As early as 1916 Pond and Brook had discussed the

possibility of such a school at Brook's homestead. The two men envisioned the boys "learning by doing" in the healthful out-of-doors and at the same time making the school self-sufficient. Pond was to be president and Brook, business manager. Mrs. Brook was to provide the homey atmosphere the boys might otherwise miss in the masculine program modeled on Teddy Roosevelt's ideal of the vigorous life. By January 1917 Pond and Brook had lost their common vision and decided to go their separate ways.

THE LOS ALAMOS RANCH SCHOOL

The Los Alamos Ranch School was a major tenant of the Pajarito Plateau for 25 years, from its founding in 1918 to its effective demise in 1942, when the World War II Manhattan Project ousted the school from its almost 800 acres. This private boys' school brought a level of sophistication hitherto unknown on the Plateau. Its main buildings occupied what is now downtown Los Alamos; nine of these buildings remain today.

The school's founder, Ashley Pond II, first came to New Mexico in 1898 to recover from typhoid fever contracted while serving as one of Teddy Roosevelt's Rough Riders. Pond was a dreamer whose business ventures were sometimes short of funds as well as practicality. He first attempted to start a sort of tutoring ranch in Valmora, near Watrous, in 1904. This never came to fruition because the Mora River flooded just before the school opened, sweeping away the school buildings. Pond became familiar with the Pajarito Plateau in 1915 and in 1916 went into partnership with local homesteader Harold H. Brook to operate a health school for boys. Neither the partnership nor the school was successful, and in 1918 Pond hired the man who was to become the Los Alamos Ranch School's only director, Albert J. Connell. Pond did not maintain direct involvement with the school after this time but maintained an interest in the school.

A.J. Connell, a native of New York City, served as a forest ranger in the Silver City area, transferring to the Santa Fé National Forest around 1914. In both Silver City and Santa Fé he was an active Boy Scout master. The Ranch School was intimately shaped by Connell's philosophy and personality; in addition, it reflected theories about health current in the early 1900s and the excellent academic preparation of its all male teaching staff.

The elevation and dry cold of the high desert were thought to be beneficial in building robust health. Students, who ranged in age from 12 to 18, were encouraged to spend as much time as possible out of doors. In the first years of the school students helped to rope, brand, and inoculate cattle and worked on the school's grounds and gardens. These rather impractical, even idealistic, aspects of school life were soon eliminated, but students continued to sleep all year on screened porches and devoted afternoons to sports and outdoor activities. Among these was caring for and riding the horse that each boy was assigned. The school uniform adopted by the 1930s was based on the Boy Scout uniform and included shorts, worn year-round whatever the weather or event.

Boy Scout Troop 22, to which most if not all of the boys belonged, provided the foundation for most extracurricular activities. The boys were ranked, based on their physical size and maturity, into one of four patrols modeled after the Boy Scouts. Summers (when an optional camp was sometimes held) and weekends were spent on horseback in the Jemez Mountains, the Española Valley, and the Sangre de Cristo Mountains. The boys learned to tie bed rolls, saddle and load horses and mules, pitch and strike tents, and to keep their equipment in top-notch condition. They fished, trapped and hunted, skied and ice-skated, and played such team sports as basketball, hockey (Fig. 1) and tennis. There was a wood-working shop and a darkroom, an annual musical theater production (with boys singing both male and female roles), and formal dances (to which the boys wore their shorts) with Brownmoor, a Santa Fé girls' school.

Each day began with outdoor calisthenics before breakfast. Classes were held only in the mornings. Boys' progress through the curriculum depended upon their ability, not their age or "level" in school. The course work was standard for college preparatory schools of the time. Many of the instructors (who were called masters) were, like Ashley Pond, gradu-

FIGURE 1. Playing hockey at the Los Alamos Boys School (Los Alamos Museum Photo Archives).

ates of Yale or other Ivy League schools. The headmaster for most of the school's history, Lawrence P. Hitchcock (Yale '19), gave these young men great freedom to teach as they saw best. High academic standards helped in recruiting students, who came from around the country and were largely sons of moderately wealthy families. Yearly tuition in 1918 was $1200; by 1942 it had risen to $2400. Potential students were interviewed in their homes by A.J. Connell, who decided whether a boy was the sort who would benefit from being at Los Alamos. Connell reserved the right to refuse anyone admission without explanation.

While instruction was generally conventional, more unusual methods are recalled by students: calculating the angle of inclination from a ski slope; understanding the effect of air pressure on the boiling point by sticking their hands into boiling water at 12,000 ft; shooting craps with an instructor; using algebra problems and Latin lines as currency to determine homework assignments. Graduation required completion of four years of English, three of both math and foreign language, and one of both science and history, along with a demonstrated ability in horsemanship. Many Ranch School graduates went on to Ivy League colleges and to become either chief executive officers of corporations or well-known in their chosen fields.

Discipline was strict in all aspects of school life, and while this was loathsome to some, most students responded well. The masters were expected to set an example for discipline, which extended even to the dining room. There are several accounts of students and masters alike being told by Connell that if they did not eat everything on their plates, they would be asked to leave the school. Although the boys had most of the afternoon free to pursue outdoor sports or hobby interests, the rest of their day was scheduled with classes, meals, study time, and bed time at set hours. Undoubtedly the school's isolation helped keep distractions to a minimum. In the early years, roads were marginal, Santa Fé was four hours away, and telephone service was primitive. For years the school kept a car at Buckman, a small town near the bridge over the Rio Grande, using horse and buckboard between the school and the river. Wolves (before they were eliminated from the Jemez), bears, and mountain lions preyed on the school livestock. Government trappers and forest rangers were frequent visitors to the school. To students from the East Coast, the Plateau seemed an exotic world. It was definitely a man's world; generally the only women present were the school nurse and a few faculty wives, a reflection of Connell's distrust of what he considered women's coddling of boys.

This highly disciplined and organized school grew from seven students in 1918 to a maximum of 47 students in the late thirties and early forties. Staff grew accordingly, but there were never more than seven masters. Although the program changed over the years, Connell made sure there was always an emphasis on the outdoors, on discipline, and on solid academic preparation, plus an unwavering focus on the students themselves. School activities were designed to benefit the boys, never the other way around.

When the United States entered World War II, the Ranch School was affected by the loss of young masters called to military duty and by falling enrollments caused by the uncertain times. In summer 1942 there were indications that the military was interested in the Ranch School site, and in November the school was officially notified that its facilities were being taken over under the War Powers Act. Arrangements were made to allow students to stay through January to finish a condensed version of the school year. (Contrary to popular opinion, Robert Oppenheimer was never a student at the Los Alamos Ranch School, but he was familiar with the area because his family owned a ranch in the Pecos.) Attempts were made to carry on the school in Taos, but these were not successful.

An ironic footnote to history is that the Army commander of Los Alamos in 1944, Whitney Ashbridge, was one of the first students at the Ranch School in 1918. Little did he suspect when he was present at the beginning of that early era on the Pajarito Plateau that he would eventually preside over the chaotic beginning of the next era.

MANHATTAN DISTRICT

The automobile, introduced to the plateau by the Detroiters of Pond's Pajarito Club, brought ever more tourists to New Mexico, including J. Robert Oppenheimer, who had been appointed to be in charge of the physics problems connected with the atomic bomb in spring 1942 by Arthur Compton. Oppenheimer was familiar with the Los Alamos area, for ever since his boyhood he had spent vacations in the Pecos region of the Sangre de Cristo Mountains across the Rio Grande Valley. Oppenheimer had often dreamt of combining his two loves—physics and New Mexico. The Manhattan Project provided him with that opportunity. As war once more intruded upon the Los Alamos scene, closing the school founded in a previous World War, scientists under Oppenheimer's direction, together with engineers and supporting personnel, poured in upon the isolated plateau to design the perfect weapon to end the Second World War. In doing so, they greatly influenced the history and direction not only of New Mexico, but also of the United States and the world.

The research on fast-neutron physics that Oppenheimer was to direct was scattered across the country among several laboratories. Oppenheimer soon saw a need to bring these various groups together in a single laboratory where the work could be coordinated and compartmentalization could be broken down. He envisioned a laboratory that would be "free internally" to discuss all aspects of the project but which would have tight "external security". That of course required isolation and controlled access. About the time of Oppenheimer's appointment, Los Alamos had attracted the attention of the Planning Board of the wartime Office of Scientific Research and Development when Percival C. Keith recommended Los Alamos as a site for the Manhattan Project. Keith had two sons enrolled in the Ranch School, and he saw the fortress-like setting of Los Alamos as meeting the requirements for isolation and controlled access. In preparation for the mammoth construction job for the bomb project, Major General Wilhelm D. Styer, on orders from Chief of Staff General George C. Marshall, had appointed Colonel James C. Marshall of the Corps of Engineers to establish a new district within the Corps. Choosing New York City for his headquarters, Marshall named the new district Manhattan. As Colonel Marshall began to organize the district, both Keith and Oppenheimer spoke to him about Los Alamos. In July 1942 Marshall and Oppenheimer together with Major Lovitt of the Albuquerque District Engineers made a reconnaissance trip to Los Alamos and two other sites. This, other visits, and site reports, plus the appointment of Colonel Leslie Groves to expedite matters eventually led to Los Alamos being selected for the project. Groves had requested that his appointment be kept secret until his promotion to General took place, for he believed that rank might be important in dealing with the scientists on the project. His command was not announced until September 22, 1942. Groves moved "with unbelievable dispatch" to acquire the Ranch School and Anchor Ranch once he noted that access could be readily controlled across the one narrow, twisting road up the mesa from the valley floor and the steep trail down the mountain from Valle Grande. Through the war and well into the fifties, two army tanks guarded the entrance to Los Alamos from the Rio Grande Valley. Groves also demonstrated his ability to get things done by being able to secure an AAA priority for the entire Manhattan Project by simply walking the request through the various offices himself.

At first Groves had wanted a Nobel prize winner and an experimental physicist to direct the Los Alamos Laboratory, but most such scientists were already involved with the Manhattan Project at other sites. He found himself considering Oppenheimer, who was neither a Nobel man nor an experimentalist. Groves' attraction to the theoretical physicist was due to Oppenheimer's ability to explain scientific matters with clarity and without condescension. This together with Oppenheimer's familiarity with the bomb project and his tremendous talent for drawing people to him led to his appointment.

General Groves issued his first directive regarding Los Alamos construction on November 30, the day before the Secretary of War notified the Ranch School of condemnation proceedings! School buildings were converted from classrooms into 20 bachelor quarters, a recreation room and a library; the arts and crafts building into a nursery school and two bachelor quarters; and a five-car garage into a fire station. New construction provided military necessities—barracks, mess hall, officers' quarters, administration building, theater, infirmary, laboratory technical buildings, utilities, streets, fencing, and most importantly finishing the school's reservoir. Thus began the establishment of the military base that eventually at the end of the war was to become a permanent community.

Oppenheimer's ideal scientific community faced practical problems, not only of security and construction in an isolated mountain hideaway, but also recruiting labor and scientists, varying climatic conditions, a serious shortage of water, and a consistent pattern of underestimating every need from laboratory equipment and personnel to housing, mess facilities and hospital beds. Most of these operating troubles which faced the project for the duration of hostilities and on into the postwar era were foreshadowed in the pages of the site reports for anyone who had wanted to give the selection a second thought, but none did. Time was more important. Act now; regret later. While isolation and security were predominant in Groves' thinking, the Shangri-La setting was the uppermost consideration for Oppenheimer.

People had to have a pioneer spirit to live in Los Alamos, especially the wives. The barracks-like apartments with their thin walls and "black beauty" stoves were nothing to write home about. Oppenheimer turned on all the personal magnetism for which he was known as a professor at the University of California and California Institute of Technology. He convinced most of those scientists with whom he had direct personal contact to come to Los Alamos and share with him the challenge of the mystery of how to release the full force of the atom's nucleus. The intensity of his own commitment made a rational appeal while the mysticism of his poetic manner made an emotional appeal that few could resist. At Saturday night parties he also turned that charm on the women to encourage them to overlook the lack of amenities on the site.

While Oppenheimer was recruiting staff, Groves was looking for a contractor for the laboratory. When Groves had questioned Ernest Lawrence regarding Oppenheimer as his choice for project director, Lawrence had requested that the laboratory be a unit of the University of California. Since Oppenheimer was on the faculty of the university, this was a convenient proposal and had many advantages for recruitment, procurement and secrecy. Prospective employees used to academic life were more willing to accept a position under a university contract. The University of California was located in a state with considerably more markets than New Mexico. While a special purchasing office was established in Los Angeles with branches in Chicago and New York just for the Los Alamos Laboratory, the University of California provided procurement experience, a recognized name and financial status. How valuable this was is reflected in the incident near the end of the war when a freight car of telephone poles was needed at Trinity site for the first test of the bomb. The freight train's progress was too slow for the laboratory's hectic schedule, so purchasing office personnel persuaded the Santa Fé Railroad to attach the freight car to the rear of the Super Chief, the railroad's fastest passenger train. Purchasing personnel often found themselves ordering items they had never heard of before. Fortunately orders made in Los Angeles and shipments there by suppliers helped to divert public attention from Los Alamos and enhance the security of the project. Materials were transshipped to Los Alamos from Los Angeles in trucks and railway cars with no markings except U.S.E.D. standing for United States Engineer District.

Even before Pearl Harbor, the University of California had established a defense committee to place the university's vast resources at the service of national security. The committee was chaired by University Regent and Treasurer Robert M. Underhill. While Groves, trying to maintain security, told Underhill that the facility would be "somewhere in the United States," Underhill insisted on knowing where and even demanding an on-site inspection. Groves finally acquiesced for time was running out. The contract between the university and the Corps of Engineers was signed in the Manhattan District 's New York office on Fifth Avenue. The historic event set the precedent for the future commitment of academia to the postwar military-industrial complex. The university's wartime contractor role was described by Oppenheimer as "distinguished primarily" by its "absence." He described laboratory personnel as "technical people who are paid and protected by the University of California but who are not normal employees of the University of California, who are not doing a normal thing for the University of California to be doing." The University of California still has the contract for the laboratory in 1996. However, its "absence" has come to be questioned in the post-Cold War era with the large "reductions in force" taking place due to reduced federal funding and a recognition of a need for more efficiency.

A laboratory publication, "Dateline Los Alamos", describes the Trinity Site test explosion thus: "On July 16, 1945, the atomic genie burst from its vessel and it lit up the desert sky with a flash of blinding brilliance. The explosion equaled 20,000 tons of TNT. The scientists who observed the world's first nuclear blast reacted with a mixture of awe, relief, solemnity, pride and later, for many, the realization that their 'gadget' might change the world forever—it did." On August 6 the first atomic bomb was dropped on Hiroshima and on August 9 the second on Nagasaki, bringing the Japanese to surrender, ending the Second World War. The people of Los Alamos had successfully accomplished their mission.

THE POSTWAR LABORATORY

Robert Oppenheimer left Los Alamos, as did many of the war-time scientists, at the end of the war. He was succeeded by Norris Bradbury, who served 25 years as director, creating and developing the permanent laboratory. He was followed by Harold Agnew and Don Kerr. Today the laboratory is directed by Siegfried Hecker.

Because the end of the Second World War did not result in the termination of the laboratory, the Cold War soon led to the development of the hydrogen bomb and a whole arsenal of sophisticated nuclear weapons and delivery systems. Atmospheric testing took place in the Pacific and Nevada until a moratorium was declared as concern grew over radioactivity from the test explosions moving into the food chain. Testing then took place underground in Nevada. The Limited Test-Ban Treaty of 1963 led to the development of satellite monitoring of nuclear explosions in space. Subsequent treaties between the United States and the Soviet Union limited strategic intercontinental weapons and intermediate range missiles in Europe. The Cold War ended with the economic and political collapse of the Soviet Union, in part due to the clear superiority of the United States in the nuclear arms race. Thus the second mission of the laboratory in national security—the need to maintain the balance of power between the United States and the Soviet Union—was accomplished successfully. In the post-Cold War era, the laboratory has a continuing national defense role with multiple missions—reducing the global nuclear danger via nuclear safeguards, non-proliferation technology, stockpile stewardship, and environmental cleanup.

With the permanent laboratory came growth and a need for quicker transportation between Los Alamos and Albuquerque for transcontinental airlines to transport laboratory scientists to meetings in Washington and at other nuclear installations. A government contract was awarded to an Albuquerque flying service known as Carco. Later Ross Airlines assumed the contract, but with current cutbacks in the Federal budget, the contract was not renewed. For a few months another small airline attempted to survive without the federal subsidy, but discovered it could not. Now in February 1996 only the many private pilots owning planes and a charter service fly between Los Alamos and Albuquerque. The automobile is the main transportation vehicle for most residents of Los Alamos and their visitors, offering a postscript of warning to the Los Alamos community. Walter Prescott Webb in his 1931 book, *The Great Plains*, proposed that successful settlement in an isolated and inhospitable environment was tied to technology and federal support. Webb believed that technology had to be advanced either to the point where it assisted settlement or to the point where it necessitated invention. Webb's thesis raises the question whether the modern, isolated community of Los Alamos, located in an arid climate amidst a rugged terrain, can subsist without modern air transportation and its large federal subsidy, which includes not only the laboratory but also the public schools and county government. Then again, perhaps the newer technologies of computerized communication and tele-conferencing have finally overcome the isolation of the Pajarito Plateau.

SOURCES

The sections by Marjorie Bell Chambers are a condensation of her unpublished doctoral dissertation, "Technically Sweet Los Alamos," based on original documents found in numerous county, state and federal archives, personal interviews, and some secondary sources. Linda Aldrich's Los Alamos Ranch School information was compiled from unpublished notes, letters, and papers in the Los Alamos Ranch School files of the Los Alamos Historical Society's archives.

Oblique aerial view, looking west, of downtown Los Alamos in the 1950s–1960s. The Sierra de los Valles form the eastern rim of the Valles caldera, and Redondo Peak and Redondito, in the center of the caldera, loom in the background.