PART II

trinity

Development of the gun-type uranium weapon, which was to become "Little Boy", moved confidently ahead, but work on implosion (the method in which a subcritical mass of plutonium is compressed to supercriticality by high explosives) was slow, frustrating and often seemingly hopeless. By late 1943 it was evident that there was no alternative: the implosion device would have to be tested.

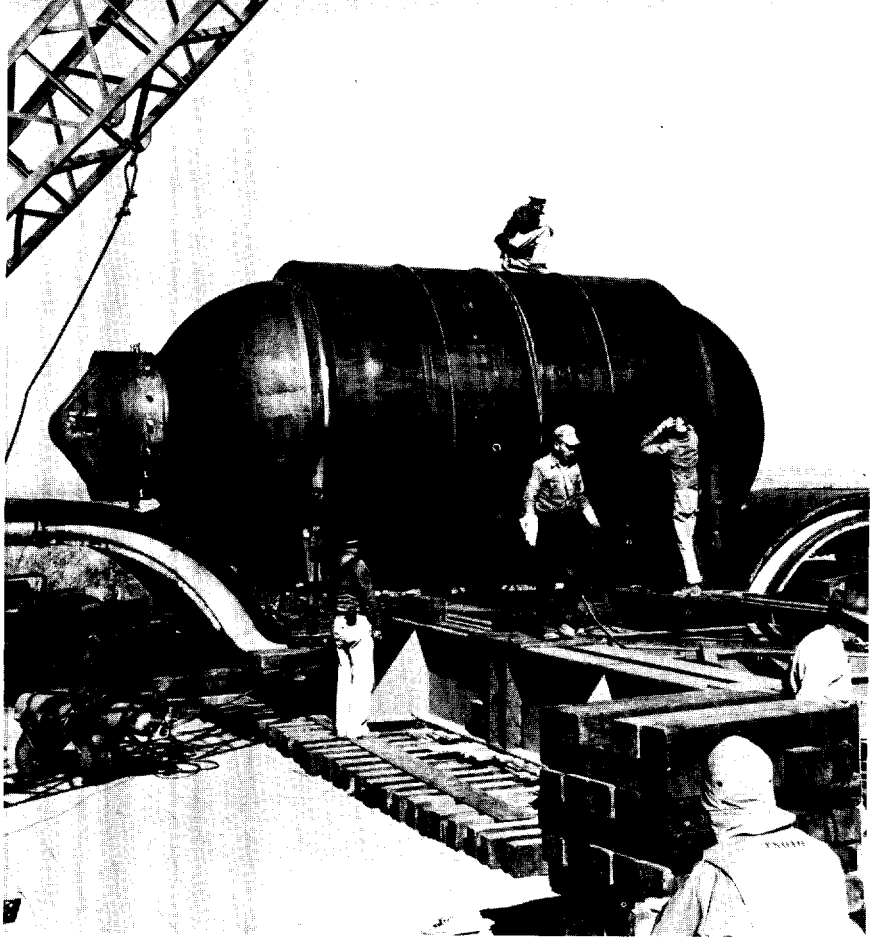
If it were not, too many questions would be left unanswered. A nuclear explosion was so entirely new, the implosion method so far removed from any existing practice, the construction of the atom bomb so entirely dependent on dead reckoning, that no one was willing to risk the first trial of such a device over enemy territory or even in demonstration for the Japanese, as had been suggested, where a failure would wipe out the crucial psychological effects of so monumental a weapon.

Furthermore, it was essential to obtain detailed and quantitative information on the various effects of the new weapon which would serve as basic technical data for tactical planning in the future. Little of this could be obtained if the explosion were first observed under combat conditions.

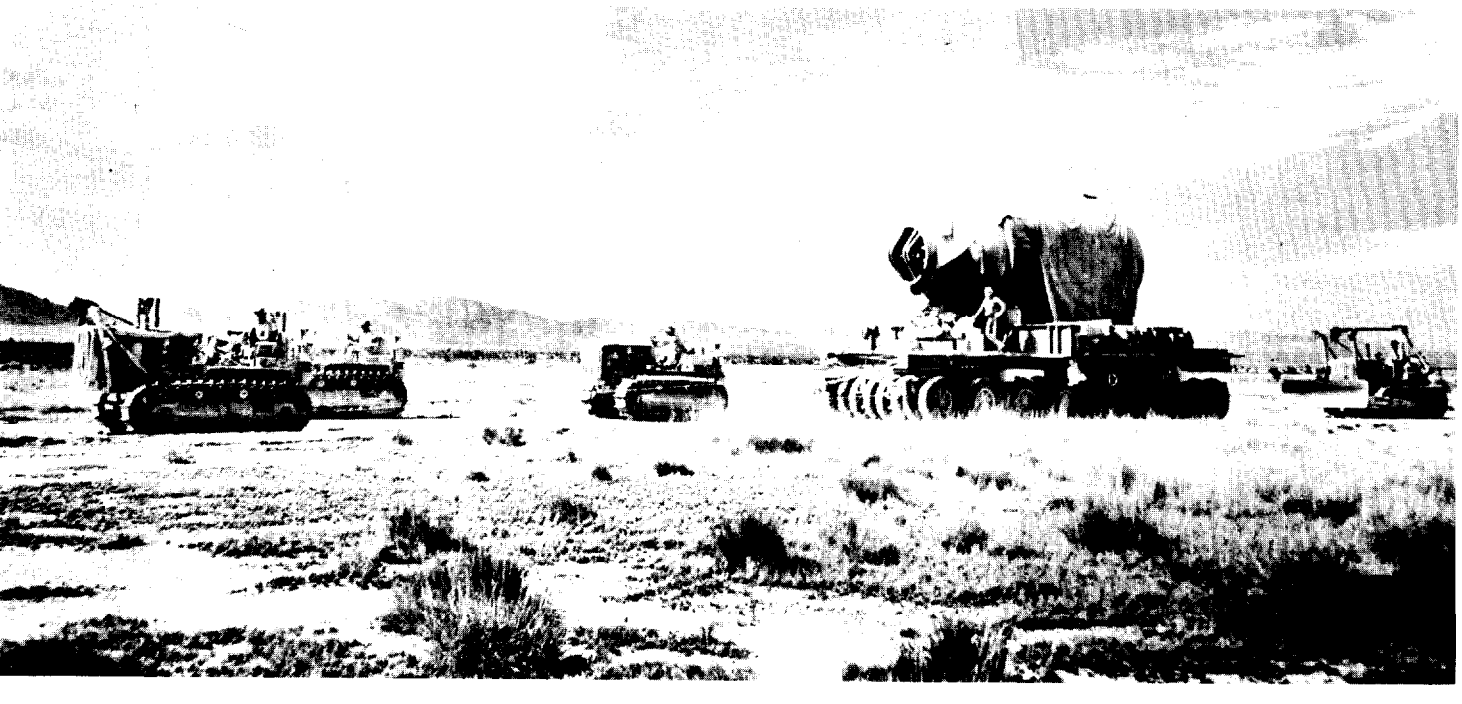
One important question, about which there was substantial disagreement, concerned the explosive force to be expected. Only an actual nuclear detonation could settle that question, and then only if meaningful measurements (requiring many new techniques) could be made.

Other questions concerned the performance of the implosion system inside the device; the destructive effects of heat, blast, and earth shock; radiation intensities; fallout; and general phenomena (fireball, cloud, etc.) associated with the explosion.

And so the decision was made to sacrifice what was to amount to one third of the nation's stockpile of atomic weapons and its entire supply of plutonium on a secret test on American soil.



Jumbo, the tremendous steel vessel designed to contain the explosion of the first atomic device, arrived at the siding at Pope, New Mexico, in the spring of 1945. Container was 25 feet long and weighed 214 tons.



A special 64-wheel trailer was required to carry Jumbo across the desert to Trinity site. By this time, scientists had more confidence in the implosion device and recovery plans had been abandoned.

the plans

The first formal arrangements for the test were made in March 1944 with the formation, in George Kistiakowsky's Explosives Division, of group X-2 under the leadership of Kenneth T. Bainbridge, whose duties were "to make preparations for a field test in which blast, earth shock, neutron and gamma radiation would be studied and complete photographic records made of the explosion and any atmospheric phenomena connected with the explosion."

With doubt and uncertainty hanging over the project throughout 1944 it is not surprising that one of the first and most heavily emphasized efforts in the test preparations was planning for the recovery of active material in case the nuclear explosion failed to take place. In 1944 there was barely enough plutonium available to conduct the essential experiments and the outlook for increased production was dim. It seemed absolutely essential that the active material not be wasted in an unsuccessful test.

Scientists toyed with the idea of using a water recovery method in which the bomb, surrounded by air space, would be suspended in a tank of water and fragments would be stopped by a 50 to 1 ratio of water to high explosive mass. They also investigated the possibility of detonating the bomb over a huge sand pile and putting the sand through placer operations to mine whatever plutonium might be imbedded there. Neither of these methods appeared particularly promising and the decision was made early in the Same to attempt to contain the blast in a huge steel vessel.

Although the container, promptly dubbed Jumbo, became a high priority project at the outset and all test plans, until the last minute, were based on the assumption that it would be used, there is little evidence that the idea met with much enthusiasm in Los Alamos.

As early as March 10, 1944, Oppenheimer wrote to General Groves outlining the plans and possibilities for "a sphere for proof firing", pointing out that "the probability that the reaction would not shatter the container is extremely small." He promised, however, that the Laboratory would go ahead with plans and fabrication of the vessel.

But this was easier said than done, and by the following summer Jumbo had become the most agonizing of the project's endless procurement headaches.

In late March, Hans Bethe, head of the Theoretical Division, wrote in a memo to Oppenheimer that because of the numerous engineering problems, which he described in discouraging detail, "the problem of a confining sphere is at present darker than ever. "

But the problem was tackled, nonetheless, by section X2-A of Bainbridge's group with R. W. Henderson and R. W. Carlson responsible for engineering, design and procurement of the vessel. In May scale model "Jumbinos" were delivered to Los Alamos where numerous tests were conducted to prove the feasibility of the design.

Feasible though the design appeared to be, there was scarcely a steel man in the country who felt he could manufacture the container. Specifications required that Jumbo must, without rupture, contain the explosion of the implosion bomb's full complement of high explosive and permit mechanical and chemical recovery of the active material. To do this required an elongated elastic vessel 25 feet long and 12 feet in diameter with 14 inch thick walls and weighing 214 tons.

Personal letters explaining the urgency of the project and the importance of the specifications went out from Oppenheimer to steel company heads, but by May 23, 1944, Oppenheimer was forced to report to his Jumbo committee that the steel companies approached had expressed strong doubts that Jumbo could be manufactured to specifications. Meanwhile, he told them, feasibility experiments would continue in the Jumbinos and the order for the final vessel would be delayed a little longer.

Eventually, the Babcock and Wilcox Corporation of Barbel-ton, Ohio agreed to take a crack at the job and the order was placed in August, 1944. The following spring the tremendous steel bottle began its roundabout trip from Ohio on a specially built flat car, switching from one route to another whereever adequate clearance was assured. In May 1945, the jug was delivered to a siding, built for the purpose by the Manhattan District, at Pope, New Mexico, an old Santa Fe railroad station that served as a link with the Southern Pacific and the Pacific Coast in the 1890's. There it was transferred to a specially built 64-wheel trailer for the overland trip to the test site.

But it was too late. During the last months before the test, all of the elaborate recovery schemes were abandoned. By then there was greater promised production of active material, there was greater confidence in the succcss of the bomb and, more importantly, there was increasing protest that Jumbo would spoil nearly all the sought-after measurements which were, after all, the prime reason for conducting the test at all.

The fate of Jumbo, however, was not absolutely settled until the very last minute. On June 11, 1945, just a month before the test, Bainbridge, in a memo to Norris Bradbury, present Laboratory director and

At Trinity, Jumbo was erected on a tower 800 feet from Ground Zero. It survived the explosion unscathed.

then in charge of bomb assembly, wrote that "Jumbo is a silent partner in all our plans and is not yet dead. . . We must continue preparations for (its) use until Oppenheimer says to forget it for the first shot."

And a silent partner it remained, Ultimately the magnificent piece of engineering was erected on a tower 800 feet from Ground Zero to stand idly by through the historic test.

Once the decision had been made, in the spring of 1944, to conduct the test, the search began for a suitable test site. Los Alamos was ruled out immediately for both space and security reasons and the search spread to eight possible areas in the western United States,

To please the scientists, security and safety people alike, the site requirements were numerous. It had to be flat to minimize extraneous effects of the blast. Weather had to be good on the average with small and infrequent amounts of haze and dust and relatively light winds for the benefit of the large amounts of optical information desired. For safety and security reasons, ranches and settlements had to be few and far away. The site had to be fairly near Los Alamos to minimize the loss of time in travel by personnel and transportation of equipment, yet far enough removed to eliminate any apparent connection between the test site and Los Alamos activities. Convenience in constructing camp facilities had to be considered. And there was the ever-present question: Could Jumbo be readily delivered there?

Throughout the spring a committee, composed of Oppenheimer, Bainbridge, Major Peer de Silva, Project intelligence officer, and Major W. A. Stevens, in charge of maintenance and construction for the implosion project, set out by plane or automobiles to investigate the site possibilities. They considered the Tularosa Basin; a desert area near Rice, California; San Nicholas Island off Southern California; the lava region south of Grants; an area southwest of Cuba, New Mexico; sand bars off the coast of South Texas; and the San Luis Valley region near the Great Sand Dunes National Monument in Colorado.

By late summer the choice was pretty well narrowed down to part of the Alamogordo Bombing Range in the bleak and barren Jornada del Muerto (Journey of Death). The area had the advantage of being already in the possession of the government and it was flat and dry although almost constantly windy. The nearest inhabitant lived 12 miles away, the nearest town, Carrizozo, was 27 miles away. It was about 200 miles from Los Alamos.

The Jornada del Muerto derives its grim name from its barren, arid landscape. Old Spanish wagon trains headed north would be left to die in the

desert if they ran into trouble since they could depend on finding neither settlement nor water for 90 miles or so.

On August 14 Oppenheimer wired Groves in Washington that he thought there would be no problem in obtaining the land for their purposes but, concerned as usual about Jumbo, specified that "the northern part will be satisfactory to us provided the El Paso-Albuquerque line of the Santa Fe can carry a 200-ton load either from El Paso north or from Albuquerque south to the neighborhood of Carthage."

The final decision was made on September 7, 1944 and arrangements were made at a meeting with the commander in chief of the Second Air Force for acquisition of an 18-by-24-mile section of the northwest corner of the bombing range.

Not long afterward, when it became necessary to choose a code name for the test, it was Oppenheimer who made the selection. Many people have tried to interpret the meaning of the name but Oppenheimer has never indicated what he had in mind when he chose Trinity. In any case, it did create some confusion at first.

Bainbridge asked Oppenheimer for clarification in a memo written March 15, 1945:

"I would greatly appreciate it if the Trinity Project could be designated Project T. At present there are too many different designations. Muncy's (Business) office calls it A; Mitchell's (Procurement) office calls it Project T but ships things to S-45; and last week it was christened Project J. By actual usage, people are talking of Project T, our passes are stamped T and I would like to see the project, for simplicity, called Project T rather than Project J. I do not believe this will bring any confusion with Building T or Site T."

Nothing was simple in preparations for the test and the securing of maps of the test site was no exception. Lest Los Alamos appear involved, the job was handled by the Project's security office which managed to avoid pinpointing the area of interest by ordering, through devious channels, all geodetic survey maps for New Mexico and southern California, all coastal charts for the United States, and most of the grazing service and county maps of New Mexico. There was considerable delay while the maps were collected and sorted.

Despite the many complicated steps taken to avoid any breech of security there were a few snafus. As soon as construction began on the test site it became necessary to have radio communication within the site so that radio-equipped cars could maintain contact with the guards and with people at the various parts of the area. Later, communication would be essential between the ground and the B-29s participating in the test. A request went out t. Washington for a special, exclusive wave 1ength for each operation so that they could not be monitored.

Months went by and at last the assignments came back. But alas, the short wave system for the ground

A portion of the Alamogordo Bombing Range was chosen as the site for the Trinity test. This section of the test site was located at McDonald ranch which served as assembly headquarters for the atomic device.

was on the same wave length as a railroad freight yard in San Antonio, Texas; the ground to air system had the same frequency as the Voice of America.

"We could hear them (in San Antonio) doing their car shifting and I assume they could hear us," Bainbridge reported later. "Anyone listening to the Voice of America from 6 a.m. on could also hear our conversations with the planes. "

On the basis of a thorough Laboratory survey of proposed scientific measurements to be made at the test, justification for all construction and equipment requirements was sent in a detailed memo to Groves on October 14. On November 1 Groves wired Oppenheimer his approval of the necessary construction but asked that "the attention of key scientists not be diverted to this phase unnecessarily. "

He needn't have worried. By August the outlook for the implosion program had turned bleak indeed. The test preparations lost their priority and the Laboratory turned nearly all its attention toward overcoming the serious difficulties that were developing. Urgency in securing manpower for research and development on the problem was so great that all of Bainbridge's group, except for a few men in Louis Fussell's section X-2c, were forced to abandon their work on the test and concentrate on development of a workable detonating system and other top priority jobs lest there be no test at all.

Between August and February, however, Fussell's section did manage to work on such preparations as acquiring and calibrating equipment, studying expected blast patterns, locating blast and earth shock instruments, and installing cables to determine electrical and weather characteristics, in addition to the design and construction of the test site Base Camp and the design and contract for Jumbo —about all the test program could demand with the plight of implosion so desperate.

Contracts were let early in November for construction of Trinity camp, based on plans drawn up by Major Stevens in October. l-he camp was completed in December and a small detachment of about 12 military police took up residence to guard the buildings and shelters while additional construction continued.

As the new year arrived, the implosion work began to show more promise and the Research Division under R. R. Wilson was asked to postpone even its highest priority experiments and turn its four groups, under Wilson, John Williams, John Manley, and Emilio Segre, to developing instruments for the test.

By February the Laboratory was mobilizing. Oppenheimer had long since been committed in Washington to a test in July and the deadline was fast approaching. In a conference at Los Alamos, attended by General Groves, it was decided then and there to freeze the implosion program and concentrate on one of several methods being investigated–lens implosion with a modulated nuclear initiator. The conference then outlined a detailed schedule for implosion work in the critical months ahead:

April 2: full scale lens mold delivered and ready for full scale casting.

April 15: full scale lens shot ready for testing and the timing of multi-point electrical detonation.

March 15- April 1.5: detonators come into routine production.

April 15: large scale production of lenses for engineering tests begin. (Lenses direct explosive's shock waves to suitable converging point.)

April 15-May 1: full scale test by magnetic method.

April 25: hemisphere shots ready.

May 15-June 15: full scale plutonium spheres fabricated and tested for degree of criticality.

June 4: fabrication of highest quality lenses for test underway.

July 4: sphere fabrication and assembly begin. By the following month the schedule had already been shifted to establish July 4 as the actual test date and that was only the beginning of the date juggling.

Overall direction of the implosion program was assigned early in March to a committee composed of Samuel K. Allison, Robert Bacher, George Kistiakowsky, C. C. Lauritsen, Capt. William Parsons and Hartley Rowe. For its job of riding herd on the program the committee was aptly named the Cowpuncher Committee and it was the Cowpunchers who had the responsibility for the intricate job of integrating all the efforts of Project Y, the arrival of critical material from Hanford and the activities at Trinity, site in order to meet the test deadline.

Trinity Base Camp was built by the Army in the winter of 1944 and was occupied by a detachment of military police from December on. By summer it was a bustling hive of activity with more than 200 scientists, soldiers and technicians.

trial run

Project Trinity, with Bainbridge as test director and William Penney and Victor Weisskopf as consultants, became an official organization and top priority project of the Laboratory in March 1945. At the same time Project Alberta, for combat delivery of the weapons, was organized under Capt. Parsons with N. F. Ramsey and Norris Bradbury as technical deputies.

Bainbridge was a Harvard physics professor with a background in electrical engineering and a three-year stint at the MIT Radiation Laboratory who had come to Los Alamos as a group leader in charge of high explosive development. As General Groves pointed out in his book, "Now It Can Be Told," Bainbridge was "quiet and competent and had the respect and liking of the more than 200 enlisted men later on duty at Alamogordo. "

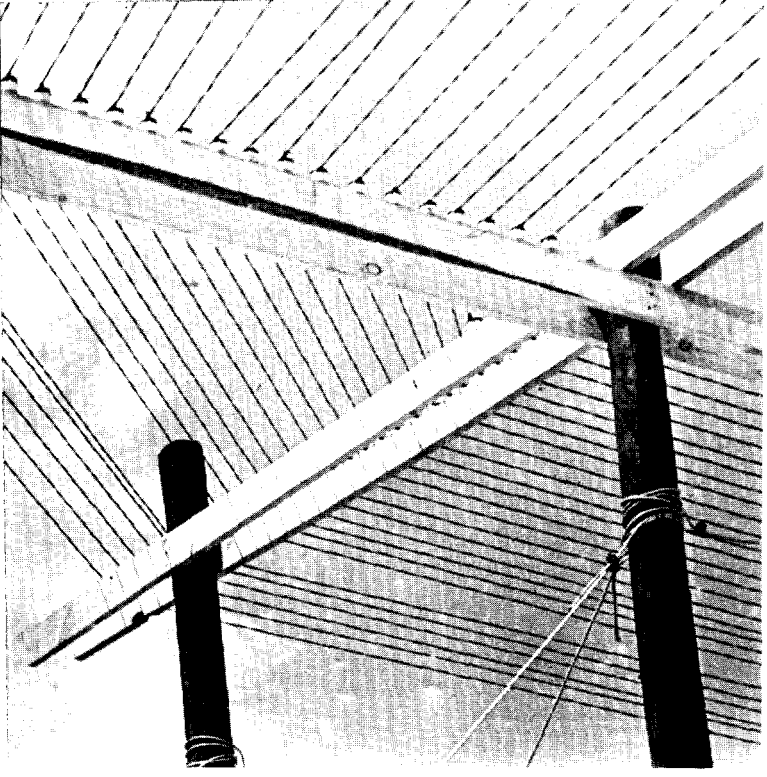
Bainbridge's first task was to rush his organization into preparations for a trial test—the detonation of 100 tons of conventional high explosivcs—which had been proposed in the winter of 1944 and scheduled for early May. Since very little was known, in 1945, about blast effects above a few tons of TNT, such a test would provide data for the calibration of instruments for blast and shock measurements and would serve as a dress rehearsal to test the operation of the organization for the final shot.

Meanwhile, a vast and complex laboratory was growing in several square miles of empty desert. There was a maze of roads to be built, hundreds of miles of wires to be strung over, on and under the ground, a complete communication system installed, buildings to be erected, supplies, equipment and personnel to be transportcd between Los Alamos and Trinity, all under the cloak of supreme secrecy.

The man who shouldered this monumental task was John H. Williams, leadcr of the Laboratory's Electrostatic Generator group, who became responsible for Trinity services as head of "['R-1. As Bainbridge wrote later, "The correlation of the construction program and the proper and successful designation of construction aid was exacting work requiring 'superior judgment, ' as the Army says, and long hours of hard work. This was done supremely well by Williams, to whom the Trinity project owes much for the successful completion of the operation." Bainbridge has also pointed out the invaluable assistance provided by Sgt. J. A. Jopp, who was in charge of all the wire installation and construction at the site.

Procurement of an incredible assortment of equipment ranging from Kleenex to elaborate scientific instruments was a seemingly insurmountable job handled by Robert Van Germert, now alternate head of the Laboratory's Supply and Property Department, aided and abetted by Frank Oppenheimer who served as Bainbridge's trouble shooter.

By April the number of urgent purchase requests had increased so rapidly that it became necessary to inflate the urgency rating's that had been in use by



Hundred of miles of wires had to be strung between base camp, the control point, the instrument bunkers and Ground Zero—one of the countless jobs that kept men at Trinity working at a feverish pace throughout the spring and summer of 1945.

the Procurement office, Until things got out of hand that spring, four ratings-X, A, B and C–had been used in order of decreasing priority. By early May, when everything seemed to warrant an X priority, it was announced that this super urgent rating would be subdivided into three others: XX, X 1, and X2. XX would be used only if failure to obtain the material would produce a setback of major importance in the overall program of the Laboratory. It authorized the Procurement Office, through the Washington Liaison Office, to have recourse to the highest authority of the War production Board and all government agencies and to use a special dispatch or cargo plane from anywhere in the United States to get delivery.

But the manufacturers were not impressed. Representatives from every armed service and government war project were pounding on their desks with equally high priorities and waiting six to 15 weeks for delivery while Trinity people were demanding three weeks delivery for the same item.

The problem was further complicated by the fact that there was no direct communication between the Project and the purchasing offices, nor could Los Alamos buyers talk directly to the scientists at the site to discuss possible substitutions or compromises on specifications.

Some items were just well-nigh impossible to get–like the seismographs that were needed to check earth shock at outlying areas around the state. The only instruments available were finally located at a firm which had already sold them to the Nazi-sympathizing Argentine government. It took an overriding directive, direct from General Grove's office, to get the instruments shipped to Trinity instead.

Another crisis came when 10,000 feet of garden hose were lost during a shipping strike. A second order was placed but by June 29 the hose was still on the list of critical items not yet on hand, The hose was used to encase cables to sensitive instruments to protect them from the weather.

Delayed delivery on a number of urgent requests led Oppenheimer to call a meeting in May to review the procurement situation. One of the principal reasons for the delays, it turned out, was the shortage of personnel in the Los Angeles, New York and Chicago purchasing' offices. Although the number of requisitions had greatly increased there had been no increase in the number of buyers since January 1944, a situation blamed on salary restrictions. As a result of the meeting salary adjustments were agreed upon and more personnel secured for all three offices. Direct communications were established between the Project and the New York and Chicago offices and Project members were asked to submit improved drawings and specifications.

But slow or not, the materials did arrive and in June the amount of goods handled by the main warehouse at Los Alamos reached its peak. During May the warehouse handled an average of 35 tons a day, 89% 01 which was incoming; during June the daily average rose to 54 tons of which 87% was incoming, and during the first half of July it was 40 tons a day, 80% incoming. A new shipping group was organized that spring to handle the outgoing goods, most of' them bound for Trinity or Tinian Island in the Pacific.

Plenty of local procurement problems remained. First there was communication. Only five people on the project were allowed to telephone between Trinity and Los Alamos and these calls were routed to Denver, on to Albuquerque and finally to San Antonio, New Mexico. Teletype service was so bad, Van Gemert recalls, that you never knew if the test site was asking for a tube or a lube job. It soon became evident that the best way to communicate was to send notes back and forth by the truck drivers.

At least two and often as many as ten trucks left Los Alamos every evening after dark to avoid both the blistering desert heat and unnecessary notice,

and arrived at the test site early the next morning. Almost always there was a stop to be made at the U.S. Engineers yard in Albuquerque to pick up items addressed to Prof. W. E. Burke of the University of New Mexico's physics department, who served as a blind to avoid a connection between the items and Los Alamos.

"We'd get things to Trinity any way we could," Van Gemert says. Some of the ways were devious. A carload of telephone poles was desperately needed at the test site and no freight train was traveling fast enough to get it there in time. After considerable urging the Santa Fe railroad consented to attach the car to the rear of the Super Chief and sped the cargo to Albuquerque. Another time, for lack of freight space, 24 rolls of recording paper were luxuriously ensconced in a Super Chief drawing room for the trip from Chicago.

To supplement the special items, the Procurement people established a complete technical stockroom at the test site early in the game and trucked the entire stock from Los Alamos. The stockroom, known officially as FUBAR (fouled up beyond all recognition), was manned by enlisted men who used their spare time to manufacture the face shields needed to protect observers from the test blast. The shields were made of aluminum sheets, mounted on a stick handle, with welders' goggles for a window.

There never seemed to be enough people to take care of all the work to be done on the test preparations and those who were available, from mess attendants to group leaders, worked at a fever pitch. A ten hour day was considered normal and it often stretched to at least 18 hours.

In the spring of 1945 a big part of the Laboratory was reorganized to take care of the test and many people found themselves involved in activities far removed from their normal duties. John Williams, the high energy physicist, took the responsibility for construction and servicing of the base camp. John Manley was wrapped up in neutron measurements as a Research Division group leader when he suddenly found himself in charge of blast measurements for the test.

"I didn't know anything about blast measurements," he recalled 20 years later. "We'd never done anything like that before."

But talent is talent wherever it is found and the displaced crews managed expertly and efficiently to bring their remarkable tasks to a successful conclusion under extreme pressure.

Throughout the spring and summer there was a constant stream of personnel traveling between Site Y and Trinity in a motley assortment of busses and cars, some of them barely able to make the long, monotonous trip.

Security precautions were rigid. In March, Dana

The flag flew at half-mast at Trinity base camp on April 12, 1945 when word came of the death of Franklin D. Roosevelt. The president's death gave Harry S. Truman the responsibility for making the crucial decision on the eventual use of the atomic bomb.

P. Mitchell, assistant director of the Laboratory, issued terse, precise travel instructions:

"The following directions are strictly confidential and this copy is to be read by no one but yourself. You are to turn this copy in to me personally on your return to the site, " the memo read, and continued with specific directions and mileages for reaching the site. "Under no condition," it went on, "when you are south of Albuquerque are you to disclose that your are in any way connected with Santa Fe. If you are stopped for any reason and you have to give out information, state that you are employed by the Engineers in Albuquerque. Under no circumstances are telephone calls or stops for gasoline to be made between Albuquerque and your destination. "

Travelers were then instructed to "stop for meals at Roys in Belen, which is on the left-hand side of the main road going south. If you leave the site at 7 a.m. you should make this stop around lunch time."

Even so, by midafternoon when the travelers reached the little junction town of San Antonio, most of them were hot, tired and thirsty and Jose Micra's bar and service station became a popular, if illegal, stop. Micra still remembers the unusually heavy traffic in those days. One of his customers, John Manley, remembers Micra's wall of bottles.

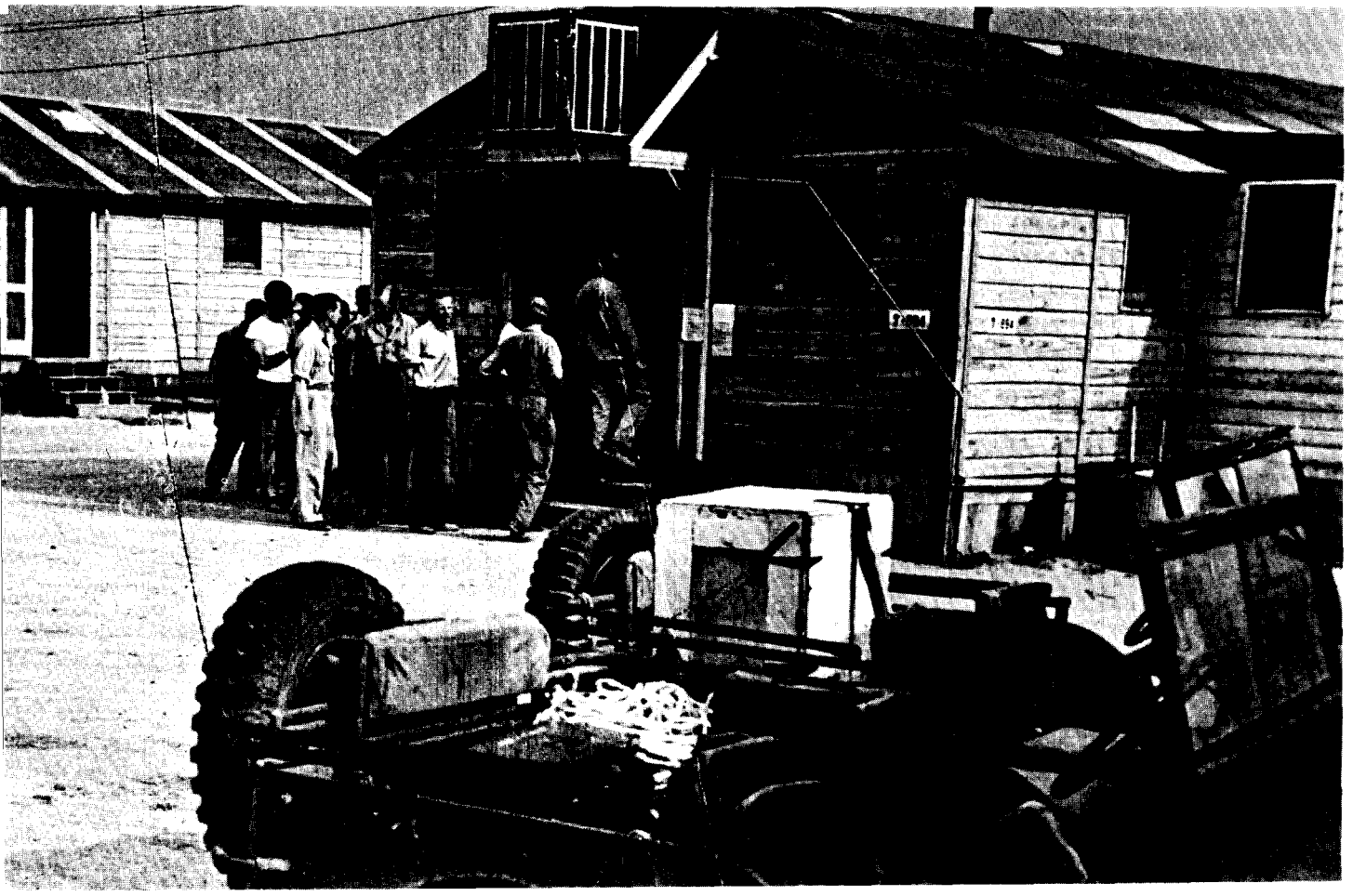
"He had the whole south wall of his place lined with bottles," Manley reports. "We used to worry an awful lot about that. If our big blast traveled that far, that's the wall it would hit." Luckily it didn't.

Additional regulations required that all departing groups and individuals stop at the office of the intelligence officer for an explanation of "the security objectives of Trinity." All personnel were required to sleep and eat at the camp rather than in nearby towns, and recreation trips for movies and dinners to nearby towns were prohibited to officers, enlisted men and civilians alike.

In addition, all Trinity-bound personnel were required to report their impending departure to Oppenheimer's office, to Intelligence Officer R. ii. Taylor, and to Lt. Howard Bush who was trying to keep Trinity base camp running smoothly despite the constantly fluctuating population.

As Bainbridge explained in a somewhat desperate-sounding memo "to all concerned" in April 1945:

"If your schedule is planned some days ahead it will operate to the comfort of all concerned if you tell Lt. Taylor who is going down and when they are going down. Lt. Taylor will notify Lt. Bush, who can then make proper arrangements for sufficient food for the mess. Lt. Bush is issued rations three days a week–Monday, Wednesday and Friday–and he is required on a Monday trip to leave a list of his requirements to be picked up on the following Wednesday trip. This means 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 . . .“

There were other problems than supply and demand. Sanitary conditions in the mess hall were difficult to maintain because of the hard water. When water softening equipment was installed later it turned out that a miscalculation in water analysis resulted in a unit too small to handle the huge amounts of gypsum and lime encountered.

In the barracks, desert creatures such as scorpions had to be carefully shaken out of clothes each morning before anyone dared dress.

But despite the difficulties the camp ran well. The heat of the desert summer was relieved by swims in the cattle watering reservoirs at the old McDonald ranch. A herd of antelope disappeared from the desert range, a fact which has been attributed by the press to the ravages of the first atomic bomb. Former Trinity residents, however, admit that hunting with submachine guns was a favorite pastime and antelope steak was an almost daily part of the camp menu. So was range beef, lassoed near camp by amateur cowboys. A beer fund maintained by Laboratory people helped make up for the rules against leaving camp and there were nightly outdoor movies supplied from the Army’s endless assortment of Hollywood films.

“The choice of Lt. H. C. Bush as commanding officer of the base camp, ” Bainbridge wrote in 1946, “was a particularly fortunate one. The wise and efficient running of the camp by Lt. Bush contributed greatly to the success of the test. It was a ‘happy camp.’ The excellent camp morale and military-civilian cooperation did much to ameliorate the difficulties of operation under primitive conditions.”

But there were times when the excellent camp morale was put to severe test.

Back in December 1944 Bainbridge had discussed with an unidentified colleague the dangers of a possible overshoot by bombers using the Alamogordo Bombing Range for their practice runs.

“If they should go north of Area No. 3 by mistake in 1945,” he wrote, “they would have to go more than 15 miles beyond the boundary in order to interfere with us. The probability that they will overshoot is likely to be very small. Let them have their fun and settle with Ickes for the White Sands National Monument.”

But within a few months they were trying to settle with Bainbridge.

The chow line forms at the Base Camp mess hall. Perhaps the menu offers antelope steak.

On May 10 shortly after 1 a.m., three practice 100-pound bombs carrying five-pound black powder flash units were dropped near the Base Camp stables, setting them afire, straddling the main barracks and bringing a poker game to a sudden halt. Three days later another bomb dropped on the carpentry shop. There was no serious damage and no one was hurt.

An investigation revealed that a squadron of bombers from a base some 2500 miles away was on its final long-range practice mission before going overseas. The lead planes had hit and completely obliterated the clearly-marked bombing range targets and in the confusion the following planes assumed the well-lit camp site must be the place.

Bainbridge’s suggestion that anti-aircraft guns loaded with smoke shells be used to defend the camp was rejected but no further bombing attacks were made.

On another occasion, however, a group of electricians working at a distant outpost stomped into camp headquarters, tossed a handful of spent machine gun shells on the CO’s desk and resigned. It was soon discovered that gunnery crews in Alamogordo bombers were encouraged to sharpen their trigger eyes on antelope herds roaming the bombing range. For the electricians it had been too close for comfort.

The original date for the trial shot of 100 tons of TNT was May 5 but was soon shifted to May 7 to allow for installation of additional testing equipment. Many additional requests had to be refused since any further delay would have put an intolerable burden on the whole group in its attempt to meet the July test deadline.

Hundreds of crates of high explosive were brought to the site from Fort Wingate, New Mexico, and carefully stacked on the platform of a 20-foot tower. Tubes containing 1000 curies of fission products from the Hanford slug were interspersed in the pile to simulate, at a low level, the radioactive products expected from the nuclear explosion. The whole test was designed in scale for the atomic shot. The center of gravity of the high explosive was in scale with the 100 foot height for the 4,000 to 5,000 tons expected in the final test, and measurements of blast effects, earth shock, and damage to apparatus and apparatus shelters were made at scaled-in distances. Only measurements to determine “cross talk” between circuits and photographic observations were, in general, carried out at the full distance proposed for the final shot.

Then, as the last day of the European war dawned, the TNT was detonated and it was spectacular. A huge, brilliant orange ball rose into the desert sky lighting the pre-dawn darkness as far away as the Alamogordo base 60 miles southeast.