

The Night the World Changed: The Trinity Nuclear Test

By **Ralph Nobles**

(Abridged Version)



**Ralph Nobles
badge photo**

Trinity is the name of the first nuclear weapons test and also the name of the area where it was carried out, a remote high desert area about a 100 miles south of Albuquerque, New Mexico.

This is the story of the Trinity Test as I saw it. Now sixty years later, and after an adventurous and gratifying life, I still look back on that night with awe and wonder.

From the stand-point of sheer drama, tension and excitement, nothing else in my life has equaled or even come close to that night at Trinity, when, for better or worse, we let the nuclear weapons “Genie” out of its bottle and initiated a chain of events that precipitated an abrupt ending of WW II.

There were three observation/shelter posts at Trinity — South, West, and North — each 5.6 miles (10,000 yards) from where the plutonium device that was to be tested at “Ground Zero.” The South Post served as Test Control as well as for observations. I was stationed at the North Shelter. The test was to occur as soon after midnight of July 15th as firing conditions and testing parameters were optimal.

We at the North Shelter had by far the most perilous post. The danger arose from the fact that the prevailing winds were from the south, which meant that the fallout would be blown north toward our position. Hence, we could be caught in possibly lethal radioactive fallout, if for some reason we were unable to evacuate the area in a timely manner. We jocularly referred to ourselves as “the expendables.”

There was no escape route northward from the North Shelter. However, there was an unpaved road leading west, and, to our advantage, west was at a right angle to the probable fallout drift, so we wouldn’t have to drive far to get clear.

It was a tense and eventful night, which, among other things, was spent striving to overcome and/or accommodate unanticipated problems, such as thunderstorms and down-pouring rain and a couple of simulated B-29 bomber runs. These bomber runs had to be aborted because each time the flight crew failed to meet the precise position and timing requirements.

When the night was nearly gone and dawn was looming in the eastern sky, and it was looking bleak for getting the test off, it seemed increasingly likely that the test would have to be rescheduled for another

day. Then, miraculously and against all odds, another countdown began, and I had a premonition that this time it would go to completion, because the weather had then cleared and the bomber runs had been canceled.

My shot time post was inside the North Shelter, which I shared with about eight or ten other scientists. We each had our own tasks, and, in addition, there were several other scientists outside, whose duties would keep them there until 10 seconds before the shot.

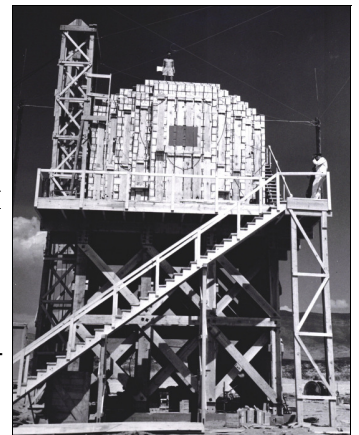
My own final task inside the shelter was to make sure that my data recorders were automatically started by the T-10 second signal from control and, if they were not, I was to start them manually.

As the countdown continued without interruption, tension mounted, minutes by minute, and finally second by second. As I recall, at minus 15 minutes the loud, clear, sonorous voice of Professor Samuel Allison came over the PA system: “Minus 15 minutes and counting. All systems go.” There was a similar announcement at minus 10 minutes. Then at minus five minutes, minute-by-minute counting began. The minus one minute announcement ended with the electrifying words “All firing capacitors fully charged and ready.”

At minus one minute, five second counting began and after minus 15 seconds, there was second by second counting. I wouldn’t have dreamed that seconds could have seemed so long, “minus 15, 14, 13, 12, 11, minus 10.” At minus 10, all the control board lights came on and a multitude of recording instruments started, including my data recorders!

At that point, my duties were finished, so I dashed for the shelter door because I wanted to get outside to see the blast. It so happened that the people outside now wanted to be inside, so there was a momentary traffic jam at the narrow shelter doorway. But in plenty of time they got in — and I got out!

Once I was outside, and everyone else was inside, I turned my back to ground zero and looked toward the distant



Scientists, including Ralph Nobles, exploded 10,000 tons to help calibrate instruments for the Trinity test. Photo from the Los Alamos Historical Museum Archives.

Oscura Mountains. Meanwhile, I heard Sam Allison intoning the remaining seconds, “minus 5, 4, 3, 2, 1, zero.”

With “zero” ringing in my ears, the most brilliant flash of light heretofore seen on earth momentarily blinded my now dark-adapted vision. When my vision cleared, the distant mountains appeared much brighter than in the noonday sun. Meanwhile, I felt radiation heat soaking through my heavy nighttime clothing. At that point, I raised my special light-shield and turned and looked directly toward ground zero. It was an awesome sight, the



Ralph was near the north bunker when Trinity exploded. Photo from the Los Alamos Historical Archives.

likes of which had never been seen before. There was a brilliant seething white-hot ball of rapidly expanding light, now maybe 10 or 20 times the apparent diameter of the sun.

The tips of my exposed ungloved, fingers holding the shield, as well as that area of my throat exposed below the shield, were beginning to feel uncomfortably hot from the radiation. However, after a bit, the heat slowed, then stopped, and began slowly fading as the fireball continued to grow, expand, rise, and cool. The fireball grew and grew, forming a brilliant, continually expanding and rising sphere of menacing proportions, a sphere that expanded and rose and gradually transformed into a now familiar “mushroom cloud.”

I was spellbound watching the shockwave racing outward and upward ahead of the rapidly expanding fireball, because, as it reached and then passed through the various atmospheric air layer interfaces, it formed a point of mist where the expanding spherical shock wave first touched. The point then changed into a rapidly expanding ring of mist. This happened at each of several air layers. I remember seeing at least three rings, separate and distinct, each formed thousands of feet higher than the one below.

Meanwhile, as the fireball continued to rise, cool, and become less brilliant, another compelling phenomenon became apparent, i.e., a blue glow of ionized air surrounding the fireball. The glow had to have been very bright to be seen against the still bright fireball. That blue glow told of, and emphasized, the deadly radiation peril of the rising, seething fireball. No one present at Trinity that night could ever forget that sinister, eerie blue glow.

It had then been about a half minute since the detonation, and as yet I had heard no sound. Then, by the light from the fireball together with the growing dawn, I saw the sound shockwave approaching. It was clearly

visible as a fast approaching line of dust, and by the shaking of the desert as it passed. It turned out to be the only approaching sound wave I have ever seen. But what a wave it was! I had braced myself, but when it hit, it nearly knocked me off my feet. I not only heard it, but also felt it. The best descriptive simile I can think of is that it was what I imagine it would feel like to be hit with a big bass drum and feel the drum skin shatter over my head.

After the initial shockwave passed, it sounded like the world’s loudest clap of thunder, thunder that echoed back and forth between the surrounding mountain ranges. It seemed to go on and on for minute after minute. After the sound had finally faded away locally, I could still hear it rumbling and echoing and re-echoing in the receding distance. Meanwhile, the seething mass of the fireball continued to rise ever higher, until I began to wonder if it was ever going to stop. I estimated from the height angle of its apparent top that it had reached at least 30,000 feet and was still rising.

Since the wind was from the south, the fireball was drifting northward toward the North Instrument Shelter. The mushroom cloud looked askew, leaning in our direction and eventually looming more and more overhead.

Since Control had decided that we should leave in convoy, we all now had to wait until Berlyn Brixner, master of high-speed scientific photography, and his colleague returned from driving 1,000 yards down toward ground zero to retrieve their photographic film before any of us could leave to escape the fallout. There was enough light to clearly see them madly driving down toward their camera station.

The field radiation monitors were telling us that the radiation cloud was drifting ever closer. It was a tense situation. Even though their roundtrip was only about a mile and a half in length, and they drove at break neck speed, under the circumstances it seemed to take forever. We were all in our vehicles with motors running, and when they got back, we breathed a collective sigh of relief and took off together in convoy, driving west as fast as road conditions permitted. We had gotten away in the nick of time and had received no significant fallout exposure.

Twenty-one days after the Trinity test, the uranium bomb, “Little Boy” was dropped on Hiroshima, Japan. Then twenty-four days after Trinity, “Fat Man,” a Trinity-type plutonium bomb, was dropped on Nagasaki. Twenty-nine days after Trinity, the Japanese surrendered, thus ending WWII.

I worked as a nuclear physicist and/or was otherwise professionally associated with the Los Alamos Scientific Laboratory for eighteen years after the war, until 1962. However after Trinity, by my choice, I never again worked on nuclear weapons development.

Copyright © September 2008 Used by permission.

Trinity Test Experiences

By William Nobles

On arrival at Los Alamos, I went to work for Dr. Emilio Segre's radiation group. This was my first job, other than field work on the farm, so you can imagine how bewildered I was. I had been hired because of my machine shop training in high school and was put in charge of the group shop. It was a responsibility I took very seriously. I had also had



Emilio Segre's group in Los Alamos. Segre is on the far left. William Nobles is third from the right. Photo from the Los Alamos Historical Archives.

some training in welding and brazing, and I had to rapidly fine-tune these skills as many of the requests for service seemed to involve silver soldering. I fabri-

cated many different types of equipment in support of the group's operations, mostly on the basis of sketches and descriptions supplied by the staff members.

As I recall, we went down to the site about two or three weeks ahead of the test date. My brother Ralph had been down there for several weeks already and had been involved with the large high explosive test shot used to calibrate instruments. As we were all very busy during this time, we saw little of one another.

One impressive item I remember was the tank called "Jumbo," which was installed about 700 meters west of Ground Zero. The original intent had been to set off the explosion inside the tank with the expectation that the tank would be strong enough to contain the explosion in the event that it did not go nuclear. This would allow for the recovery of the plutonium. By the time of the test, though, enough confidence had been gained that Jumbo was not used. It was left in place to see what would happen to it and its support structure, a very strong steel tower about three stories tall. I had never seen anything with which to compare it. I have always considered it to be indicative of the way things were done on the project, after spending all the effort to get the tank in place, and then de-

cidating that it was not needed.

An important aspect of our work was the measurement of prompt gamma rays emanating from the "gadget" at detonation. To carry this out, a sunken bunker was built about 530 meters from ground zero. It was dug so that the top portion was above ground and covered with loose dirt. The interior of the shelter was about a 12-foot cube with walls and ceiling of reinforced concrete. The shelter door was a 1-inch steel plate sealed with half-inch steel bolts. A very sturdy structure!

The recording instrumentation was put into a hermetically sealed cylindrical steel container about 30 inches in diameter and about 4 feet long. It was suspended from the walls of the shelter by means of bungee cord to isolate it from the shock-wave.

There were two sensor chambers on top of the shelter, mounted on top of steel pipes that went through the roof. We protected these from the weather by a pair of ordinary galvanized steel garbage cans. When preparing for the test shot, we threw these cans to one side without giving it much thought. More on this later.

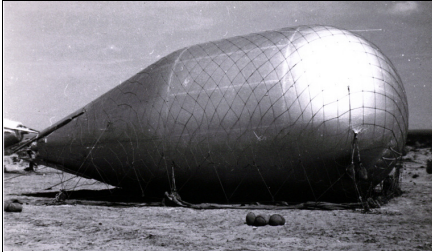
In addition to the sensor chambers on the shelter, sensors were suspended beneath a pair of barrage balloons. These were the type of balloons developed and used in the "Battle of Britain" to combat low flying bomber aircraft. Our crew had to learn how to fly these balloons, and we had several near misses as people nearly got lifted off the ground while handling ropes. These balloons were flown one above the other, at an altitude of about 500 meters. A balloon tether cable, paralleled by the shielded instrument cable, ran down to the electronics and recorder in the shelter.

We had very bad weather — lightning, thunder all about, and intermittent rain — the night before the test, so it was in danger of being canceled. Still if the test was to go, the diagnostic instruments had to be ready, so we proceeded to launch the balloons in the midst of the storm. I suppose we were all considered expendable as there was a war going on.

My assignment was to guide an instrument cable as it came off the reel. Another crew member would periodically tie it off to the flight cable. I wore a pair of heavy leather gauntlet gloves to protect my hands from the shielded cable, which sometime had loose wires that would puncture the hands. I noticed when lightning struck in the nearby Oscuro Mountains, I would feel a spark jump through the leather. Needless to say, we were all

happy to have that operation complete and beat a hasty retreat to base camp. Ben Franklin's ghost must have been watching out for us that night.

We speculated as to what would happen to the balloons when the "gadget" went off. Some thought



A barrage balloon used for testing at the Trinity site. Photo from the Los Alamos Historical Archives.

they would just be torn loose and go drifting off across the desert.

Once we got back to base camp, the first item of business was a visit to the mess hall for a delayed dinner.

Then we went to the barracks for a short rest. We found it difficult to rest as we were all keyed up. Soon, we went up to a site we had determined would be a good place to view the test. We were warned not to look at the location directly as the flash of light might blind us. I procured a glass from an arc-welding hood and inserted it into a sheet of plywood. I tested this by looking directly at the sun and was able to look at it continuously with no discomfort, so I felt it would adequately protect my eyes.

The waiting seemed interminable, and all sorts of rumors were circulating. After what seemed an eternity, the countdown started. As the last ten seconds wound down to zero, the tension was great! Finally, at zero, the flash came. I remember vividly the sensation of heat on my fingertips holding the plywood shield and on the section of my neck below the wood. It seemed as though the sun were rising from the desert! While I was flash blinded for a few seconds, I was always glad that I had watched these first moments because of the unique sight of the early fireball. It appeared to be a brilliant hemisphere rising out of the desert soil. It quickly seemed to jump from the ground and grew into the characteristic mushroom-shaped cloud. By this time I had recovered from the flash blindness. The cloud seemed to be alive with seething fire inside and with a layer of vivid purple glow over the exterior. It just kept going up and up. I noticed the circular rings forming above it as the shockwave went through the different layers of the atmosphere. About that time that the shock wave arrived. We had been warned to expect it, but with the distraction of watching the fireball, we had forgotten, so it came as a real shock. Up until that time, I don't recall much in the way of sound from the spectators,

but now there were muffled cheers and sounds of people congratulating one another.

After milling around a bit and expressing amazement to one another, we headed off to the mess hall for breakfast. That seemed like a popular decision, and most people repaired there. The MP crew was visibly impressed by what they had seen. They were soldiers who had volunteered for hazardous duty and had been expecting some sort of combat assignment. Instead, they had been put in the desert, riding herd on a bunch of nutty looking scientists. Now they realized they had been a part of something big that could end the war. Their attitude was completely different toward everyone. They were all smiles and friendly.

I can't remember the rest of that day very vividly. I suspect we were all too tired and sleepy and went to crash out in the barracks. I also don't remember if we went back to Los Alamos that same day or if we stayed over and went home the day after.

After several days had passed and the site had cooled somewhat, we made another trip down to Trinity site to recover our experiment data. We were suited up with canvas booties and dressed in coveralls. I remember going into the shelter and being impressed at the damage done. All the dirt piled on top had been blown off the roof of the shelter, and the timbers supporting the dirt roof over the entrance to the shelter had been splintered and collapsed. The sensor chambers on top of the shelter were still intact as they had been designed to resist the blast. The garbage cans that had been used to protect them from the weather had been casually thrown to one side in preparation for the test, and one of them happened to be pointed directly toward ground zero. The bottom of this one was pushed in into a cone shape as the shockwave impacted, and then as it progressed up the side of the can it collapsed the sides around the cone. This was on an open can, so you can imagine the forces involved. Very impressive!

The interior of the shelter functioned as it was designed to do and was intact. We recovered the records from the instrument canister, but I never learned whether the experiment was a success.

The most impressive thing in the after-shot observations was of the Jumbo tank. The heavy...
Continued on the next page



Eight seconds after the detonation of the gadget.

Trinity Remembered

Continued from the previous page

strong steel tower was blown down and twisted all awry. The tank itself was tilted about 15 degrees off vertical. I could imagine what the blast would have done to a normal building structure.

None of us had anticipated the dramatic demise we saw for the barrage balloons. The effects on the balloon cable from the radiation and shockwave were very dramatic and clearly visible in the photographs. The effect of the impact on the balloons themselves was even more dramatic as they were sprayed out into a cloud of smoke. I have never understood why this has not gotten more attention from observers. The effects of the shockwave on the instrument shelter were also very dramatic as the

loose fill dirt used to cover the shelter was blown off and was to be seen in the official photographs as a large dust cloud rising from the area where the shelter was located.

Addendum: Shortly after the Trinity test was completed, and the bombs had been used on Hiroshima (August 6) and Nagasaki (August 9), I was drafted and went off to Fort Bliss, Texas, to be inducted into the army on VJ Day (August 15). I have always remembered riding on the train down to El Paso to go to war and seeing the people in the small towns we went through out celebrating the end of hostilities.