

The Atomic Bombings of World War II: The Views of the Radar Man

The following testimony was written by Jacob Beser, and was intended to be delivered as the keynote for the 6th International SAMPE, Electronic Materials and Processes Conference in 1992. During the Second World War, Mr Beser served as a radar specialist in the US Army Air Force and was a member of the flight crew on both atomic bomb missions against Japan.

Subsequently, Mr Beser would become a founding member of the Sandia National Laboratories, after which he worked on various defense projects for Westinghouse. Here he worked alongside Leonard Atran, father of Artis co-founder Scott Atran.

On this 75th anniversary of the first nuclear attack, we submit this account detailing Mr Beser's experiences in the Army Air Force, his path to joining the crews of both the 'Enola Gay' (Hiroshima) and Bockscar (Nagasaki) in 1945, and his thoughts thereafter.

This account is substantially expanded on in the book: 'Atomic Warfare 1945', written by Jack Spangler and Jacobs son, Jerome. It is available to purchase in both hardcopy and eBook formats here:

<https://www.amazon.co.uk/Atomic-Warfare-1945-Jack-Spangler/dp/1545009252>

Artis International thanks the Beser family for their kind permission to present this testimony. In this era of renewed nuclear proliferation, accounts such as this constitute a critical reminder of the importance of effective conflict resolution, the promotion of peaceful relations between all peoples and - ultimately - the consequences of failure.

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History will note that for almost half a century I pursued my craft in various Engineering environments and it was not until after I had been retired for eight months in 1985 was I given the opportunity to speak to a distinguished assembly of my peers; and then with the admonition to make it sound like "Engineering Talk". This morning makes the second time in forty-seven years that this opportunity has been once again extended to me, and for this I am extremely grateful.

When a dear friend and colleague from my years at the Westinghouse Company, asked me if I would take this assignment, it was with some hesitation that I agreed. I wondered how much today's sophisticated engineer, with his own PC and advanced mathematical techniques, really cared how we did things those many years ago; but then I remembered that it was during the war years that the foundation was laid for all of the techniques that we use today. It was my classmates that worked with men who were in the forefront of our profession and at the outbreak of the war were doing their research in our Great Universities. Men like Luis Alvarez and Norman Ramsey were able to take we youngsters and steer us along pathways that were defining the new state of the art in electronic design. This was without the aide of a PC, I might say, but a trusty K&E log-log slide rule or the old hand cranked Monroe Calculator.

More often than not, we used empirical methods; nomograms came into vogue and then cut and try, file to fit methods were the style of the day. After we learned to describe our problem analytically, the analog computer came into play; a mass of precision components that usually filled a lab, consumed lots of power and gave us answers with accuracy's of the order of +0.5%, which, whether we liked it or

not, usually sufficed for the simple reason that in most cases we had a human being in our loop and he served as a dynamic element that could smooth our data and give us the accuracy we needed to deliver our weapons.

I mention all of the above to help set the stage to introduce you to the how I became involved in the Atomic Bomb program.

In 1941 I was a senior at Johns Hopkins majoring in mechanical engineering.

For some unknown reason, not that any reason might be required, Saturday night, December 6, 1941, turned out to be a night that we students felt the need to "Howl". Along with several of my colleagues from the Johns Hopkins Class of 42, we went on a "Pub Crawl". We initiated this expedition at the Chanticleer Club, one of Baltimore's better show bars, and went downhill from there to a variety of neighborhood taverns [Read; Saloons] in both East and South Baltimore. At each stop, since it was December, a month with an "R" in it, we were able to partake of succulent Chesapeake Bay Oysters at a price that would be unheard of today, twenty-five cents a dozen shucked, or fifteen cents a dozen and you shuck them. Each dozen was washed down with copious quantities of Arrow Beer and a potion known as BLACK DEATH, this latter being a nickel shot of Schenley's Black Label serving as the core of a "boiler maker". When the legitimate places were forced to close, we transferred operations back to Orleans Street Just East of the Viaduct, where one could find numerous "Blind Pigs". These were places that looked like ordinary row houses or stores, but they serve the same function as the legitimate saloons without the benefit of a license, and where the patrons stood a high risk of a ride in the "Paddy wagon" to the Central Police Station where they would be assessed the going rate for such a violation; usually the contents of one's wallet plus an IOU for a few dollars more.

Just prior to Sunrise, about 7 AM, my Model A Ford, going mainly on its own initiative and guidance, found its way back to Windsor Hills, about twenty miles across town where I lived. To this day I can only assume that this trip was uneventful as even at the time I had no recollection of the journey. Needless to say I made lots of ZZZZ's, when at 4 PM my father could stand it no longer, my sleeping that is, so he decided to wake me up to inform me that Pearl Harbor had been attacked and the nation was at war. If I didn't get up soon I would miss the whole thing. Initially, I had a little trouble trying to comprehend what he was saying as there seemed to be a full scale battle being waged within the confines of my head. My misery was further abetted by several houseflies who for some reason or other insisted on stomping their feet on my head.

After a cold shower and a pot of black coffee the fog began to lift and I was able to comprehend just what it was that Hans Kaltenborn and Gabriel Heatter were saying on the radio. The Japanese had hit us hard and without warning and the damage was not minimal. Not only that, by the time I awakened the Philippines were being reconnoitered and would soon come under attack.

By late evening I had made my decision. Bright and early Monday morning I would go downtown and enlist as an Aviation Cadet in the US Army Air Corps. This had been my objective for the preceding several years, and although my parents had thwarted me up to now, surely this time they would acquiesce, as I would be doing the very same thing they both had done in 1917 when President Wilson took the US into world war I.

I waited until breakfast the next day to announce my decision, and much to my satisfaction I met no opposition when I reminded mother how she had left Columbia University to join a Field Social Service Unit of the Jewish Welfare Board to serve with the AEF in France and Dad how Proctor and Gamble's loss was the AEF's gain when he became a "Cannon Cocker" in the "Big Red One", the Army's First Division that was to become the first American Unit to join the French in the Marne Valley and engage the enemy.

I was convoyed to the recruiting station so that my parent's could sign a permission slip for me to take this step. I was not yet 21 years old and I could not legally act in my own behalf. By noon of Monday, December 8th I was sworn in as Private Jacob Beser and told to await a call announcing the formation of my class in cadets. I withdrew from school, without prejudice and began a wait that lasted until June 4, 1942 at which time I reported to the Commandant of Cadets at the AAF Technical Training Command, Scott Field, Belleville, Illinois.

On Saturday, October 3, 1942, I graduated from Scott Field and was commissioned as a 2nd Lt. USAAF Reserve. I came out fifth in my class of 250 and whether I liked it or not I was selected for special schooling at Harvard and MIT. I didn't like it and promptly made my feelings known. I wanted to go to England where the Air Force was beginning to operate against the continent and eventually Germany. I had a few unsettled scores with the Germans. My wishes were not to be honored but a compromise was reached. I would go to Florida, to a place called Boca Raton, and pursue a course in operation and maintenance of the new, secret equipment called Radar, then I would be assigned to the 8th Air Force in England. This suited me fine. I got on a train and headed south.

Twelve weeks later I had become proficient in the operation and maintenance of the various airborne equipment extant at the time and had also demonstrated ability as an instructor. My academic standing was also very high. Without as to how I might feel about it, the Army assigned me to Orlando AAF where a new center had been set up to train cadres for new groups being formed to go overseas.

I was not exactly thrilled with this new assignment. In trying to get it changed I discovered that I was really the personal pigeon of the Chief of AAF Communications. There was a group formed in Orlando known as the Air Force Board. In addition to my assignment as an instructor in the Bombardment Division Communications School, I had additional duties as a Project Officer to the Air Forces Board. I soon found out that the Air Forces Board was charged with the task of solving design problems in new production equipment that had been delivered to the field and just would not work. It would be my job to work with the equipment at Orlando, install it in an airplane and fix the problem. Once I was sure that the problem was fixed, I would have the task of working with the manufacturer in designing retrofit kits that could be sent out into the field and installed either at depots or even at the squadron level.

This was to be a most valuable experience and the main reason that I mention it was that it kept me and my performance known at the Pentagon. Along the way I returned to Boca Raton and took the new course being given by Hugh Winters and the people from RRL at Harvard called Radio Countermeasures. This was enhanced by further operational training received at Eglin Field Auxiliary. This was the base reserved for the most highly classified projects and had been used in the training of General Doolittle and his B-25 Task Force, the first Americans to bomb the main island of Japan.

In the Spring of 1944 I realized that there was a full scale war going on against Germany and I was still not part of it. I also realized that since I graduated I had been working for people who did not own me, and that the people that did own me were in Washington and either they didn't care or were too busy with other things to look out after my welfare. This prompted me to get orders cut allowing me to travel to the Pentagon and try to work my problems. I was halfway successful. My boss, Col. Canterbury got a promotion approved for me within hours of my arrival at his office.

I had arranged an interview with General Ulio, the Adjutant General of the Army which was not nearly as successful. I had explained to the General that I had family suffering in Germany under the Nazis and that I had a very strong desire to inflict harm upon them. The General saw no reason why I should not be given the opportunity to have my wishes fulfilled.

I was asked to wait in the outer office while the Sergeant-Major went to retrieve my records. About a half an hour later the Sergeant-Major returned with my Jacket Folder and I saw the two of them shaking their heads. I was called back into the office and the General told me that for some reason my file had been "Flagged" and that even he could not touch me. He suggested that I return to my station and be patient; he was sure that it would all come out in the wash.

I returned to Orlando only half satisfied and fully determined to find a way out.

The path to Hiroshima had already been laid out for me, but it was not to be known for another few months. I did find a way out of Orlando. I arranged an internal transfer to the 9th Bomb Group, our own demonstrator and the people who arranged this were unaware of any restraints on my services and did not need permission from Hq. USAAF to relocate me at the center. They knew that the 9th had been selected to form the Cadre of the 313th wing of the 20th Air Force; another feeder into the B-29 pipeline to the Pacific Theater.

The 9th was moved to Dalhart, Texas, where it was divided into four cadres, and I was assigned to Hq., 504th Group to be trained at Fairmont AAF, Nebraska. By July Of 1944 I was getting awfully bored flying around in the back end of a weary B-29 that managed to catch fire in at least one engine on at least every other take-off. Training consisted of long hours in the air, exercising the pilots, navigators, and flight engineers, while the rest of us played cribbage, hearts, or worked cross-word puzzles. I requested and received permission for three days of leave in Chicago; I needed time to think and discover some better way.

My three day holiday grew to seven, thanks to some very sympathetic friends I made along the way; and oh yes, I neglected to inform anyone that this was going to happen. In effect, I was AWOL. When I returned to base the reception committee consisted of one irate Colonel, and a Captain eager to impress the Colonel by showing him how he could throw the book at this renegade Lieutenant. The Colonel was not impressed and decided that the best thing for me would be a few months in the 393rd Squadron under L/Colonel Tom Classen whose chief claims to fame were that he had landed one of the first B-17's on Quada canal, and had been shot down by a Japanese fighter and survived. Tom was an excellent leader and stern disciplinarian. I had known Tom in Florida, thought the world of him, and agreed that this would be much better than a Courts Martial.

I was in the 393rd less than a month when a freeze order came down from the training command; nobody in or out of the 393rd. This was followed immediately by a most unusual set of Temporary Duty Orders.

The squadron, with all organizational equipment "would move for a period of indefinite temporary duty to Wendover AAF, Utah." This was an abandoned training base on the western edge of the Bonneville Salt Flats. If one has never been there, I can only describe it this way; if the United States ever needed an enema, this is where they would insert the tube. Obviously, something was in the wind and we would never rejoin the 504th. We did not have to wait very long to find out what was happening. After a very few days we were called to an assembly in the base theater where L/C Paul Tibbets introduced himself to us as our new commanding officer. Tibbets then informed us that the group had been selected for a special mission, our identity would be changed and we would never return to Fairmont. Those of you who stay and complete the rigorous training program will be going overseas and will take part in an effort that will win the war. But, secrecy is of the utmost importance and we would never find out the details of the mission until the day it is pulled off, so just have faith.

He also informed us that that until he was ready to begin his training program everyone would be given two weeks leave of absence to go home, but there was to be no discussion of where you are now based and that you had been selected for a special program. Finally he said that everyone was free to go except Lt. Jacob Beser, and would he please report to the commander's office in the next fifteen minutes.

When I reported to Col. Tibbets' office, I was ushered into his inner sanctum where a fair sized group was apparently waiting for me .

I was introduced to Navy Captain William Parsons (aka Deke), L/Commander Frederick Ashworth (aka Dick), and a Dr. Hal Brode of the University of California. A Major McLanahan (Security Officer) and Colonel Tibbets completed the group.

I was told that I was about to be interviewed for a fairly sensitive job. They asked the usual questions an applicant would normally expect, where did you go to school? What military schools have you attended? What work experience have you had since coming on active duty? ETC. ETC. As I spoke I noticed that they referred to some prepared notes that they all had. Then Dr. Brode looked me straight in the eye and asked me the following question; "How do you feel about flying combat?", we are asking this because even though we already have people who can do the job we have in mind for you, our people are too valuable to risk." I could see my life expectancy going down and my insurance premium going up, but I swallowed once and then directed his attention to the silver wings that I was wearing and reminded him that combat was precisely what I had been trained for and that indeed I was even looking for. My answer got the hint of a smile from Col. Tibbets as he excused me from the room and asked me to wait in the outer office.

About fifteen minutes later I was called back into the inner office to be greeted by a smiling group and "welcomed to the team". What team or for what job was yet to be disclosed to me.

Several days later I was instructed to be on the flight line prepared to go on a three or four day trip. What type of clothing should I bring? warm and cool? Where are we going? You'll find out. The next morning I reported to the airplane, I was greeted by a civilian who proceeded to remove all of my Air Force insignia and supplied me with Corps of Engineers Castles. He never paid any attention to the "50 Mission Crush" hat that I was wearing, which was to be a cause of some consternation to my assigned "Escort" later the next day. It was also at this point that I learned that for the duration I would have a constant companion whenever I traveled or went off the base.

As we were leaving the ground and I was flying in the right seat in lieu of a copilot or flight engineer, the pilot, a close friend named Arthur Henderson, turned to me after I had raised the wheels and was in process of lifting the flaps and said "I always thought that you were Air Force". I told him that I was when I left my quarters about an hour ago, but that the civilian in the crowd changed things for me. "Oh yes", I was told, he's security, you're probably going along with the Colonel and Commander Ashworth." He said it, I didn't and I had just been party to a breach of security.

We got our final flight clearance to Santa Fe, New Mexico. As we were clearing the local area the pilot then congratulated me as he told me that I was probably going to Site "Y" with the folks. This to me appeared to be the second breach of security. I later found out that I had passed my first Security Test. Henderson was not only the pilot but was also the security monitor for the flight, and he was under instructions to test me. Since I only listened and offered no information nor requested any, I had passed the test.

At the Santa Fe airport a car and driver met us and took Tibbets, Ashworth, and myself to the Mesa at Los Alamos School for Boys where a whole new world was about to open for me.

We went directly to the office of Dr. Norman Ramsey, who was a young Ph.D. from Columbia University. He ran the fusing and firing division. He was in the process of giving me a familiarization briefing when I was paged over the public address system. Commander Ashworth realized at once that he was supposed to have taken me to the office of the security officer for a special security briefing. He accompanied me to this office after the page call, and offered explanations as to why I had not appeared there first and gave assurances that as of the moment, other than being aware of the existence of the place, I had not yet had disclosed to me any of the details of the mission. The 2nd Lieutenant on duty, who had sent for me, tried extremely hard to impress the both of us with the seriousness of the situation and proceeded to instruct me in the ins and outs of handling any information I might receive there. He stressed the importance of not letting on to the people outside of the Technical Area that I was in the Air Force.

My security briefing having been completed, I was then taken back to Dr. Ramsey's office where I was given a rather thorough briefing as to what was expected of me. He never mentioned the words atomic bomb. He just called it a weapon. Ramsey said that they wanted this weapon to burst over the ground at a precise altitude and they had been working on the problem but they weren't nearly as far along as they should be. At no time did he come right out and say that they were trying to build an atomic bomb, but words like fundamental forces being released, chain reactions taking place, were used. The assumption was, I am sure, if I had enough brains and stayed there long enough I would figure it out, or begin to associate names from the world of Physics with the phenomena. By the end of the first day, I knew what was going on!

We had lunch at the lodge. Names like Dr. Nils Bohr, Dr. Enrico Fermi, Dr. Hans Bethe, and Dr. Leisa Meitner were bandied around. It all began to add up. These were all names that I had become familiar with through my friends who worked in the Physics Department at the Hopkins. It suddenly dawned upon me, that about a year before Pearl Harbor things in this area had gone "silent". Some of my friends had even gone underground with their work and I seldom ever saw them. It all spelled "mother" and I became quite excited about the whole thing.

As I mentioned earlier, security was of absolute importance on the project and maintained from the very beginning. I would be working with the scientists at Los Alamos supporting the radar altimeter proximity fuse design. Furthermore I was aware that this was an atomic project with the objective of building a bomb. It would be my responsibility to determine that there was no electronic radiation present over the target that would interfere with the operation of the proximity fuse. I also had been told that I would fly with each one of them until such a time that the medics said that I had had enough. No one would venture a guess at that point in time how many of the weapons were planned for use.

On my second night at Los Alamos and despite all of the precautions that had taken to disguise my military affiliation, I went to the Post Exchange with Mr. Sheldon Dike, a mechanical engineer who at one time worked for the Martin Co. in Baltimore. While standing at the counter waiting to be served a beer, a WAAC standing alongside me whispered to her friend "that little fellow is wearing a "40 mission hat" if ever I'd seen one." Both of us realized that in the attempt to disguise my service affiliation a hat change was in order, since no other branch of service would tolerate the Bancroft Fighter hat. Needless to say, we left the PX at once and returned to the guest lodge where I was staying. After I told the story to Ashworth, I was assigned an escort to be my shadow at all times whenever I left Wendover, except for the times I would travel with Colonel Tibbets. It was his job to make sure that I did not meet or talk with anyone about what we were doing. A real problem on a date! And, yes I lost him a few times. With the passage of time, my escort became a bodyguard. By the time Hollywood acquired the story and produced the movie "Enola Gay" even I found the story a little

far fetched and incredible; this despite the fact that I had tried to convince the producer and writers to tone it down.

At Los Alamos I became part of the "Fusing and Firing" group. It was a part of Dr. Ramsey's "Z" division of the Laboratory. This division was responsible for the proximity type device, barometric devices, power supply and storage for the initiation of firing, and telemetry including the packages that would be dropped over the target area to do what we now call Bomb Damage Assessment.

Dr. Ramsey briefed me about the many problems that his division was working on and asked me where I thought I could help them the most. Since he seemed to be adequately staffed except for people with a familiarity with aircraft and field testing, I suggested that here was an area where I thought that I could do him the most good. I outlined for him several problems that I saw; Final Design and testing of the field patterns of the fuse antennas. Verification that the fuse would work reliably, and proof testing of some of the telemetry schemes. I sensed that I had hit a responsive chord as his enthusiasm grew with each of the items that I enumerated. There was a lot to do and a readiness date to be met. What I didn't know at that point was that I was not to be relieved of any of my responsibilities with the new 509th Group, but that all of this work for Los Alamos was to be part of my "Additional duties as assigned".

As of now I would be working with a Mr. Lem Skaggs at the Laboratory. It would be my responsibility to see that nothing interfered with its proper operation over the target. I was also told that I would fly with each one of them until such a time that the medics said that I had had enough. No one would venture a guess at that point in time how many of the weapons were planned for use.

Over the next several months Dr. Doll would periodically come to Wendover with things for me to do. I managed to install and flight test the modified AN/APS 13 Tail warning Radar which was to be used as our proximity device; complete the design of the 400Mhz antennas that would be used with the radar; build and operate an antenna test range where my antennas were installed on dummy bomb shapes and their field patterns characterized; and, finally install the APS 13 and antennas and firing mechanisms on dummy bomb shapes. These were dropped over our range and tracked by ground radar and theodolites. With the combination of radar, optical, and radio telemetry instrumentation we were able to determine the altitude of the spotting charge detonation.

We had more than our share of good fortune, for as we raced towards our target date of Christmas 1944, every test went as planned and we had gotten off 9 good drops. Captain Parsons decreed the end of this phase of our program. I argued for more to continue in parallel but he pointed out to me that I was scheduled for two months in Cuba with the rest of the 509th Group to get extended training in long range over water flying, while in Cuba he wanted me to become "the sharpest Signal Reconnaissance guy around, because when we got over Japan he didn't want me to have any hesitancy in doing my job". This is where I learned that what I had suspected up to now was what was really going to happen. Nothing was going to be left to chance and I would be there to continuously monitor and evaluate the Electronic Environment over Japan.

At this point I began to wish for more time. Even during the war, except for the fighting, things began to slow down between Thanksgiving and Christmas. I needed time to get to both MIT and Harvard to find out what was the latest and greatest equipment I could put my hands on by January 1 when I was scheduled to go to Cuba. With the priority of "Silverplate" I was able to get the latest versions of search receivers and panoramic adapters extant, signal recorders and analyzers to play back through, and a few other goodies that were not yet in the catalogs. The best goody was a direction finder that was modular and covered the 400Mhz Band that I was to be most interested in. I wanted to be able to see, hear, D/F, and analyze any signal that might pose a threat to our proximity devices.

I was fortunate in getting everything that I went after. While all of this was going on I had to find time to go back to Eglin Field in the Florida Panhandle to be sure I became proficient in the proper operation of this new equipment. I was assigned a separate instructor to work with me in a dedicated B-17 Aircraft and we put in many hours of flying around the Gulf Coast sharpening my skills.

Upon my return from Cuba at the end of February 1945 I found one more request from Col. Tibbets that had to be filled. The Joint Target Study Committee had narrowed down the potential targets for our operation, what was left for resolution was the tactics that we might employ. As the Electronics Officer to the 509th Group, Col. Tibbets wanted me to be with him when this debate took place, because surely some resolution of the use of Radar had to be achieved, and he was fully aware of what my operators and Navigator-Bombardier teams could do. We had a minimum of 80 radar drops in our training program, both at night and through the overcast. It was at one of these meetings in the office of General Leslie Groves at the Pentagon where I achieved some notoriety on the one hand and praise from my colleagues on the other. If any of you remember the movie *Enola Gay*, it was at a point in the meeting where an Admiral was making a case for surfacing a submarine off the coast of Japan and laying a Shoran Line down over our targets so that we could ride his beam "right down Broadway", and in a loud stage whisper I turned to the Colonel next to me, who happened to be the superintendent of the Radar School at Boca Raton, Florida, when I attended there, and I said "Bull Shit".

General Groves asked me what I had said, and as I watched Colonel Tibbets getting redder all the time I repeated "Bull Shit". The General asked me why I had said that, although I suspected that he already knew since he owned a graduate Degree in Civil Engineering. I asked for and received his permission to go to the blackboard and proceeded to demonstrate the RHO/THETA relationship and put in a few numbers that showed that with the effects of wind and the struggle against tidal currents this fellow couldn't get us within 4 to 10 miles of our target, and I could show that I had Radar/Bombardier teams in the 393rd Squadron who scored consistently 500 foot or less CEP's in our training program; besides which each of the selected targets were ideal radar targets; what's more the AN/APQ 13 Radars we were using were being maintained by the best technicians in the Air Force. I knew because I had hand picked every one of them and personally supervised their training and that of the Assistant Radar Officer and the Non-Coms.

I won my point but not my battle. The record shows that the issue of a Navy Supplied Remote Guidance Beam was tabled from further consideration and the issue of radar bombing was decided against its proponents. The reason stated was the apparent unreliability of the AN/APQ 13 at high altitude. The O-Ring seals of the transmitters, modulators, and high voltage power supply had a tendency to allow loss of pressure and this caused the system to go off the air. We had a demonstrated fix for this. We installed a pressure air make-up system on our airplanes that allowed the operators to maintain specified pressure for the entire mission. This was accomplished by the installation of a separate Oxygen Tank and Bleed Valve and pressure gage in the aft compartment of the aircraft at the operators position. This tank was hard connected with copper tubing to the Transmitter/Modulator Can and the high voltage power supply. The operator was able to constantly monitor the pressure and supply make-up air. Anticipating 6 hours maximum at high altitude, above 25000 feet, we had a 100% reserve. You can't win them all. I moved overseas to the Island of Tinian in the Marianas Group in late May of 1945. Here there was to be more training, this time with the added feature of live ammunition being fired at you by the enemy. By-passed islands were used as practice targets. The Japanese left in these locations must have really suffered as they came under bombardment day and night for weeks on end with no let-up. An occasional ship would make it to them to resupply their ammo and perhaps a little food. They were even able to keep some of their early warning radars operating so that they knew when we were coming and they always had a reception for us.

The next phase was to prepare the Japanese for our operation, we began sending single ship sorties over the Empire dropping dummy fat man shapes loaded with High Explosives. The aircraft would drop its load and then proceed to execute the break-away maneuver to be employed when the real bomb was dropped. 45-50 seconds later when the bomb hit, there would be a tremendous blast and hopefully the selected target would disappear.

On July 16, 1945, the first atomic bomb test in history took place at Alamogordo, New Mexico. One of the most important pieces of data desired in the test was never obtained. It was intended to have an airplane positioned over the range in the same location he would be had he dropped the bomb, and in this way assess the effects on the delivering agent. Because of adverse weather and a slightly delayed take-off the airplane was approximately 10 miles out of position and the desired data point was missed. This just added a little more adventure to our first operational drop. Immediately after the New Mexico test Parsons moved his entire group to Tinian to supervise the final assembly of the operational weapons and to fly the mission as required.

Since this weapon was so new and relatively untested, even the operational drops were treated as laboratory tests. Beside the regular flight crew the strike aircraft would carry myself and 300 pounds of my equipment, a weaponeer with a 25-pound flight test box which would operate throughout the mission monitoring the vital sub-assemblies and circuits, and a senior project officer in command of the weapon and authorized as a special deputy of General Groves to make real time decisions as required.

There would be two escort aircraft; one carrying photographic instrumentation capable of photographing and timing the growth of the fireball from detonation, and the second carrying parachute deployed canisters carrying condenser blast gauges which were parts of the frequency control circuitry of the 50Mhz transmitters in the canisters and the modified Navy FM receivers which received the canister output on board the escort and fed the demodulated signal to special film recorders, to be processed later on the ground and analyzed.

Successful data gathering would yield numbers to drop into equations whose answers would be the explosive yield of the bomb. Parenthetically just let me note here that the best laid plans do not always work, and so it was to be in this case also. The Hiroshima mission went like clockwork. - By the book. - Rendezvous with the escorts precisely on time. Weather reports from the advance weather reconnaissance aircraft precisely on time. Weather enroute exactly as forecast with the arrival over the target within seconds of the estimate. The bombardier was off target by 500 feet, but in this case only his pride and reputation suffered. We felt two distinct impacts from the direct and reflected shock wave. I never saw the intact city of Hiroshima. I was busy doing my job during the approach to the target, and during the escape maneuver I was pinned to the floor by the "G" Forces generated in the turn. When I did get to the window, I saw the most bizarre scene I had ever witnessed in my entire life. A huge multi-colored mushroom cloud had climbed well above our flight level, still very active and changing, while down below the city of Hiroshima was completely covered by an ugly black boiling mess with new fires to be seen breaking out on the periphery as the cover widened.

There could be no doubt that the city had suffered enormous damage and with it the inhabitants had to be absorbing a tremendous rate of casualties. It was difficult to conceive that all that we saw was the result of the effort of one airplane and one bomb.

As we returned to Tinian, Tibbets put the Enola Gay in cruise control to minimize fuel consumption and we were in a long powered glide all the way back to Tinian. During this time I thought back to the briefing that we received prior to take-off for Hiroshima. Captain Parsons, who briefed us on the results of what is now known as the Trinity Test conducted at Alamogordo, New Mexico, spoke in terms of twenty kiloton TNT equivalent yield. The very words were enough to boggle one's mind. My only prior

experience with TNT was the results of one pound blocks that we used in training as Aviation Cadets and later in pre-overseas readiness training. It was absolutely impossible to mentally extrapolate from the 1 pound to 20,000-ton equivalencies. Besides, my limited combat experience had not been gathered as part of any large, multi-aircraft operations. I just didn't have the mental tools to make a realistic estimate of what it would be like.

A single thought was going through my mind as I observed our handiwork below. How much more of this can a nation allow its citizens to suffer? It appears as if what Paul Tibbets had told us that first week at Wendover was certainly true - if this weapon works it will help bring the war to a speedy conclusion.

The most important item giving emphasis to the above was the fact that we did all of this with a single airplane and a single bomb. Just imagine what could happen in the future when many of these bombs could rain from the skies from many aircraft simultaneously all over and adversary nation. An entire nation of people could be instantly obliterated. What I saw at Hiroshima, and then again at Nagasaki, began a process within my mind that has ultimately led me from what initially started out as a hope to the present where hope is no longer the operative but has been replaced with an axiomatic truth. If mankind is to survive, we must never again allow ourselves to use nuclear weapons.

The Nagasaki Mission three days later was a fouled up mess from the outset. In particular it is not well known but this mission was jinxed from the "get-go" with both equipment and personnel problems and almost ended in disaster.

The Nagasaki mission bomb was called "Fat Man" and was an implosion type bomb that had been tested about three weeks earlier at Alamogordo, New Mexico.

In Fat Man, an explosive nuclear reaction occurred when a sub-critical mass of plutonium nuclear fuel was compressed to a critical mass by an implosion process. This process was about 16 times more efficient than the Little Boy gun type bomb used at Hiroshima.

In the Fat Man design, a softball ball size plutonium core and a neutron source initiator sat in the center of uranium and aluminum spheres. This core was surrounded by over 5000 pounds of high explosive charges that were used to compress the core. Completing the bomb assembly was the electrical firing mechanism all surrounded by a steel armor case sufficient to withstand a hit from a 50-caliber shell.

Now for what really happened in getting the bomb from the United States to Nagasaki.

The plutonium core and the initiators were transported to Albuquerque by automobile where they were loaded C-54 for transport to Tinian via Hamilton AFB, Hickman and Kwajalein. The C-54 lost an engine on leaving Hamilton and had to return and transfer the load to a spare aircraft. From Kwajalein to Tinian the plane ran into a storm and the box carrying the material was bouncing around in the compartment. It was finally secured by tying it to the leg of a cot with a piece of rope.

The bomb itself less the nuclear fuel also had its own problems in getting to Tinian by air. Immediately after take-off from March Field the life raft door blew off and the raft fouled the elevator. As a result they had an emergency go-around and landing with a load of gas, twelve guys and the bomb onboard.

The pilot, a man by the name of Costello, was a real interesting person. He very seldom showed any excitement when things were happening. But, to hear him tell about it later was a real comedy. That guy came close to having "it" right then and there. But he was a skilled pilot. He knew his B-29 and he

knew what he could do with it. So he managed to stay airborne long enough. They kept him up there a couple of hours to lighten his load and then he maneuvered it in using mostly trim tabs because he had a fouled elevator.”

On Tinian I went into the assembly area as the nuclear fuel was being inserted and the final assembly was in process. In a few hours it was to be loaded but there were two holes that did not align properly. A technician was busy with a rat-tail file enlarging one of the holes. I never knew whether this was a design, a dimension or a workmanship problem. Was there ever a fit-check performed back in the states? But in any case the problem was corrected on-site.

Before the bomb was rolled out to the loading pit, everyone in the area signed the bomb and sent their personal regards to Hirohito.

Col. Tibbets picked Major Chuck Sweeney to command the mission based on personal friendship even though he had never flown a single combat mission. That risky decision almost proved fatal to say the least.

The bomb was loaded on to the Bockscar and made ready for flight and the final crew briefing held around midnight. There would be only two targets this time - Kokura and Nagasaki. Because of a severe weather front the three plane mission rendezvous would take place over Yakushima Island instead of Iwo Jima as had happened for the Hiroshima mission.

The flight crews arrived at the plane at 1:00 am and started preflight preparations. Everything was going just fine until the flight engineer and Sweeney started to confer over the intercom. The fuel could not be transferred at the normal rate. Suddenly Sweeney ordered the flight engineer to shut down the engines and everyone to evacuate the plane.

The Bockscar had been loaded with over 7,200 gallons of fuel. As a part of the preflight routine the flight engineer discovered a problem transferring fuel between the two 600 gallon auxiliary tanks in the bomb bay. The fuel transfer pump appeared to be malfunctioning again. Because of the 3-hour weather window, there was no time to transfer the bomb to another plane.

The weather forecast enroute to Japan was marginal. There was a question as to whether or not there was a malfunctioning fuel transfer pump which would move reserve fuel from the auxiliary tanks in the after bomb bay to the main tanks.

After delaying take-off one hour it was decided to go any way and if a fuel shortage appeared, Iwo Jima or Okinawa were available as refueling sites.

One of the contingencies due to the bleak enroute weather outlook was to use Yakushima Island off lower Kyushu as the rendezvous point for the three aircraft making the strike as opposed to Iwo Jima which was used three days earlier. This would bring the group a little closer to the two potential targets and provide some margin in time.

En route to the Yakushima the planes encounter rough weather at the planned altitude of 8,000 to 10,000 feet. Sweeney didn't want to subject the bomb to any more shock or vibration caused by rough air than he had to. So he flew at 17,000 feet and burned more fuel.

The realities were somewhat worse. The low pressure trough lying near the briefed flight path was much worse than expected with far greater rain squalls and adverse winds. There were few if any useful navigation aids and everything relied upon the dead reckoning skills of the navigators; two

were good and one not so good. Radio silence had been ordered therefor there was no inter-aircraft communication. If there had been I had in my compliment of black boxes the only airborne VHF Direction Finder in the Pacific and could have been of some help.

The two aircraft that made the rendezvous loitered in the rendezvous area for 45 minutes then proceeded to the primary target that had been briefed and reverified by the weather reconnaissance aircraft. On the assumption that the third aircraft had also copied the weather messages we headed for Kokura, an industrial city on the Northern tip of Kyushu hoping to find our missing comrades loitering in this area. what we did not know was that the primary operator of the instrumentation cameras had been left behind. It seems that when being issued his parachute equipment, he walked away from the counter with two life raft packs and no parachute pack. This was discovered as the plane was ready to taxi for take-off. This man was put off the plane and the pilot was told to leave without him, rather than further delay an already delayed departure.

We arrived over the city of Kokura just about one hour behind our adjusted attack time. If we indeed had a fuel transfer problem, we were at the leading edge of trouble, we arrived at the Initial Point of the bomb line and began our run. The bombardier was complaining all the way that he was having trouble picking up his briefed aiming point. Yawata, which was the Pittsburgh of Japan had been fire bombed two nights before and was still burning. Kokura lay downwind of Yawata and had a pall of smoke and haze in the area. Run #1 was NO DROP. Run #2 was the same. As we were circling to begin Run #3, I began to detect activity on the Japanese Fighter Control Frequencies, what was worse was that signals with airborne characteristics were beginning to appear, with the airborne signals showing increasing signal strength with each transmission. About midway in the third run, the bombardier again said that he was unable to see his target. At that point I notified the flight deck that I felt that we might soon be under attack. When the tail gunner got on the interphone a few seconds later and said that he saw several fighters well below and spiraling up, a command decision was made that we would abandon Kokura and head for Nagasaki our alternate target. A recap of our situation revealed that we had been in the Kokura area exactly one hour; with the throttles bent to the wall and the turbo boost control turned to the safety wire, we had consumed 900 gallons of gas. The flight engineer's best estimate was we could make Nagasaki, but would have to take Okinawa as our refueling stop and hopefully we could make that. He allowed no more that thirty minutes in the target area, including drop and observation. The next decision that had to be made was what to do if Nagasaki was still socked in. At about 7AM it was 10/10 tenths covered, we still had to contend with our orders not to drop by radar. This change was clearly up to Commander Frederick Ashworth, the Senior Project Officer on board and responsible to General Groves.

We had a brief discussion, Ashworth, Van Pelt (the Navigator) and myself. I had looked at the radar operator's scope and felt that the APQ-13 was really performing and excellent imagery was available to Van Pelt. Van Pelt concurred, said that this scope was as good as or better than his charts. Ashworth did not hesitate long, none of us wanted to see the weapon jettisoned in the ocean and we couldn't make it to anywhere if we didn't get rid of it. Major Sweeney, the a/c commander was told to head for Nagasaki. Van Pelt gave him a route that would bring us very nearly on the briefed Initial Point and bomb line. As we were leaving Kokura we were startled by an incoming call on our own VHF Control Frequency.

Sweeney had inadvertently pushed his Radio Call Button when he had intended to push his interphone button to inquire about the location of our escort.

"Chuck, where the Hell are you?" was the incoming message. Major James Hopkins in the missing third aircraft heard Sweeney's accidental call. He was beginning to get low on fuel and had been out of touch for several hours. In desperation he sent out this call. If we hadn't already alerted the Japanese, this kind of thing certainly would. Needless to say, we ignored the call. As we closed in on Nagasaki,

our worst fears turned out to be true. The city was completely cloud covered and we were now on our own. We proceeded on a radar bomb run. Everything was going smoothly. The radar navigator-bombardier team was working exactly as described in a manual on "Bombing Through The Overcast" that I had written during my stay in Orlando. We were about ten seconds from the drop line when I heard the bombardier say "I've got a hole, I'm taking it,... Bombs Away". The aircraft lurched upwards as it was relieved of its 10,000 pound load. I saw the proximity devices come on as Sweeney went into his escape maneuver. About 49 seconds later I saw the interior of the plane light up from the now familiar flash. The down wing side scanner removed his goggles and saw the mushroom rising. Ahead of it was a wave of compressed air. The distortion due to this wave made it appear to him that the mushroom was coming right at us. His expression of his fears in no uncertain terms generated a wave of apprehension which was not dispelled until some seconds later when the cloud safely passed us by as it made its way to the tropopause.

Once again I did not get to the window until after the plane leveled off and I saw anew the scene that I had witnessed just three days earlier at Hiroshima. The explosion had cleared out much of the cloud cover but nowhere in the vicinity of the base of the mushroom cloud was there any city to be seen. There was the same boiling mass of debris with new fires breaking out all around. There was one difference however; there were undisturbed parts of the city to be seen behind the hills surrounding the area we had hit.

Unlike Hiroshima, where we felt two distinct shock waves hit the airplane, this time there were three components. This caused some concern up front. Commander Ashworth reasoned that normally there would be only two components; the direct component from immediately above the explosion, and the reflected from immediately below the explosion. A third component had to be coming from the side, and if this were true we were out of our primary target area. A close examination of the chart by himself and the Navigator led them to conclude that instead of hitting the main part of the city, we had hit the Urakami Valley just northwest of the city and in reality had missed our briefed aiming point by some 1 1/2 to 2 miles! When we finally returned to our base it was recognized by our interrogators as a fortuitous happening of some major consequences. The message of the new weapon being delivered in rapid fashion was sent, but the actual casualty figures for this drop should be somewhat less than they would have been in the center of the city.

As we were leaving the target area we heard another call on our VHF Radio. Once again Major Hopkins was calling, "Chuck, where the Hell are you?" we were now certain that our missing escort was still airborne and in the vicinity. Since radio silence was no longer of any advantage he was answered and told of our plans, we were going five miles off the western coast of Kyushu and heading direct to Okinawa, we wanted everyone in the area to know where we were because our fuel problem was now critical, so critical that we called the emergency air-sea rescue service that had been set up for this mission and notified them of our predicament. Nothing like getting everything ready in the event we had to ditch.

As we came into the Okinawa area we felt somewhat relieved. Sweeney and his flight engineer had gotten us this far and hopefully would get us safely to the ground.

The nearest airstrip to our flight path was Yontan. As luck would have it, they were landing a large flight of B-24's just returning from sorties over Japan, we called "Mayday" to no avail. In the pressure of the moment two pilots, a navigator, and a radio operator forgot that they had special signal operating instructions and that a special indicator should have preceded their distress call. The pilot ordered the flare pistol fired.

Here again special instructions were not followed, but flare shells were fired with the supposition that red stood for emergency. Ordinarily it would have, but this day it meant something else. But an

interesting thing happened. One of the pilots in the traffic pattern spotted this B-29 boring for the runway ahead of him with reckless abandon and had seen the flares being fired. He sensed trouble and peeled out of the pattern as did the other B-24's behind him. We were now aimed for the end of the runway in a sharp decent. As we flared to touch down the two inboard engines coughed and died. Since we came in long and hot, we approached the end of the runway still doing 90mph. The options were two; go over the cliff and into the bay, or take the 90 right turn and hope we make it. We did the latter and then realized that the ambulances and fire trucks that we saw waiting were following us to a hard stand that had been designated.

About an hour later when the trucks arrived to refuel our plane, they "Stick Measured" the center main tanks and found only 35 gallons of fuel remaining. That is why our inboard engines had quit. It takes at least 50 gallons to sustain head when flared for landing. I have now described for you: How I became involved in this operation and some of the roles that I played, and A thumbnail sketch of the two missions. To complete this account I will tabulate for you the results of these two missions and their equivalence in conventional weapons at the time.

ATOMIC BOMB COMPARED WITH OTHER WEAPONS EFFECTS AND RESULTS

| | Hiroshima | Nagasaki |
|---------------------|-----------|-----------|
| PLANES | 1 | 1 |
| BOMB LOAD | 1 | 1 |
| POP DENS/SQ MI | 35,000 | 65,000 |
| SQ MI DESTROYED | 4.7 | 1.8 |
| KILLED& MISSING | 70/80,000 | 35/40,000 |
| INJURED | 70,000 | 40,000 |
| MORT RATE/SQ MI | 15,000 | 20,000 |
| CASUALTY RATE/SQ MI | 32,000 | 43,000 |

| | Tokyo Raids | Urban Attacks |
|---------------------|-------------|---------------|
| PLANES | 297 | 173 |
| BOMB LOAD | 1667 Tons | 1.129 Tons |
| POP DENS/SQ MI | 130,000 | Unknown |
| SQ MI DESTROYED | 15.8 | 1.8 |
| KILLED& MISSING | 83,600 | 1,850 |
| INJURED | 102,000 | 830 |
| MORT RATE/SQ MI | 15,300 | 1,000 |
| CASUALTY RATE/SQ MI | 11,800 | 2,000 |

FORCE LOAD COMPARISON HIROSHIMA RAID

229 B-29 equivalent
 1000 Tons Incendiary
 400 Tons High Explosive
 500 Tons Anti-Personnel

21,000 Tons Yield*

NAGASAKI RAID

125 B-29 equivalent

225 Tons Incendiary

675 Tons High Explosive

300 Tons Anti-Personnel

12,000 Tons Yield*

*Results due to target Size and Configuration were imperfect- The full potential 22,000 Tons High Explosive and Incendiary and 500 Tons Anti-Personnel

NORMAL B-29 LOAD WAS 10 TONS

Source: The US Strategic Bomb Survey 30 June 46 For those of you that might be interested, there is a report available from Los Alamos, LA-8819, The yields of the Hiroshima and Nagasaki Nuclear Explosions, by John Malik. The report was issued in September 1985.

John called me in 1983 asking if I had available any of the original flight data or copies thereof. I didn't, but I was able to give him some leads. Anyway, he told me that he had just been assigned the task of completing the calculation of yields of these two drops. The task was originally initiated in 1945 and early in 1946 the White House ordered it put on the back burner.

At the time of his call to me, circa 1979, with so many of the original participants retiring or having passed on, it was felt that the time was almost past to complete this task. Periodically over the next few years John kept me informed of his progress. In 1986 I received a copy of his final report.

HOT OFF THE PRESS. It is interesting to note that after all of these years we finally have a set of numbers that most workers will agree to. They are as follows:

AT HIROSHIMA

Pressure/Time Data 16KT

Equivalent Thermal 14KT

Cypress Charring 15KT

Equivalent Blast 15KT

Recommended Yield 15KT

AT NAGASAKI (Based on measurements at Trinity and Crossroads)

Radiochemical 20.3KT/21.7KT

Fireball 20.8KT/21.4KT

Calculated 22KT

Recommended Yield 21KT

The moral of all this is plainly evident. These early weapons were devastating to say the least, with 50,000 of the most modern warheads in the combined arsenals of the US and what was the USSR, there is no question in my mind that if we ever play this game again, it will be a lot longer than 40 years before anyone will be able to sit in a body such as this and discuss the effects. It is conceivable that there will be few left who will care to or have the ability to talk about the day that civilization as we have come to know it will have perished.

In closing I would like to remind everyone that the Japanese did not sign or agree with the Geneva Convention rules for warfare and, in their opinion, for good reason. Based on their perspective of warfare they did not expect to take or be taken prisoner, as their code of military conduct required all soldiers to fight to the death. If faced with the prospects of capture the only honorable thing to do was to commit suicide. This code was obvious in the American Island hopping campaign. Using Okinawa as an example about 110,000 Japanese combatants were killed with only about 7000 taken prisoner. In America, nothing is more natural in the time of war than for our leaders, whom we elected to attempt to ensure victory with a minimum loss of life. For our armed forces the extravagant use of firepower was the approach to achieve the desired effect and had been employed from day one. Fire bombing raids on the Empire are good examples. Using the atomic bombs against Japan was simply the ultimate step in this approach. Some people may not want to believe it but those two bombs ended the Pacific conflict in short order.

I have often been asked if I had any remorse for what we did in 1945. I assure you that I have no remorse what-so-ever and I will never apologize for what we did to end World War II. Humane warfare is an oxymoron. War by definition is barbaric. To try and distinguish between an acceptable method of killing and an unacceptable method is ludicrous. To suggest that one specific act of war is barbaric and thereby illegal is to imply that other forms of slaughter are acceptable and legal! If you have to die in warfare what is the difference of being killed by a bomb or a bullet?"

I thank you very much for your attention. If there are any questions I will try to answer them.