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How the Superfortress Paced the Attack Against Japan

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SYNOPSIS: *The B-29 Story. Twenty years ago this fall the first B-29s, operating from the newly captured Marianas, struck the Japanese home islands. It was the first blow in an aerial campaign that, in the next nine months, was to reduce Japan's war industry to rubble and so lower the morale of the Japanese people that, many say, the war in the Pacific could shortly have been ended without either atomic bombs or the scheduled land invasion. The aircraft that brought this about was the Boeing B-29, whose numbers increased from a relative handful to an aerial fleet of 1,000 Superforts and whose achievements included the devastating firestorms of the spring of 1945.*

Twenty years ago last month 111 B-29s of Brig. Gen. Emmett "Rosy" O'Donnell's 73d Bomb Wing left Isely Field, on Saipan, and set course for Tokyo, some 1,500 miles away. This mission, code-named San Antonio 1, was the first B-29 attack against Japan from the recently captured Marianas and the first attack upon Tokyo since Jimmy Doolittle's carrier-based raid of April 18, 1942.

Weather was bad to and over the target, and only eighty-eight B-29s were able to drop their bombs at all. Of these, only twenty-four bombed the primary target, but the appearance of the Superfortresses over their capital on November 24, 1944, brought home to the Japanese people the stark reality of the situation. American airpower was now within reach of the home islands. Worse, the Japanese Air Force couldn't do a thing about it. Within nine months this aerial armada grew from a single bomb wing with 119 aircraft to five wings and a thousand B-29s. The course of the Pacific war was soon to change abruptly as the weight of American airpower was felt.

PHOTO: *Brig. Gen. "Rosy" O'Donnell, 73d Wing CO, briefs B-29 crews. At right are Brig. Gen. H. S. Hansell, XXI Bomber Command CO; Col. Walter C. Sweeney, Jr., 73d Wing C/S; and Col. J. B. Montgomery, Hansell's DCS/Ops*

The B-29 forces, which operated from the Marianas were a part of the Twentieth Air Force, activated in Washington on April 4, 1944, with Gen. H. H. Arnold, Chief of the Army Air Forces, as Commander. The Twentieth operated directly under the Joint Chiefs of Staff and was unique in that the headquarters resided in Washington while the combat element was in the Marianas, more than 8,000 miles away. Since Guadalcanal in 1942, United States forces had been engaging Japanese forces in battle, but, until the arrival in the Marianas of the XXI Bomber Command, the homeland, the sustainer of the war effort, had been untouched, save for the Doolittle raid and a comparatively minor effort by the XX Bomber Command from China.

The tentacles of Japanese expansion were being crushed, but the heart was untouched until the X.XI Bomber Command—the combat arm of the Twentieth Air Force—began a systematic and cataclysmic series of attacks, short in duration but terrible in their intensity.

The defeat of the Japanese Empire is unique in modern military history. For the first time, a major nation surrendered, totally and unconditionally, without a single invader having set foot within its borders. Germany surrendered in 1918 before actual invasion, but invading troops in large numbers had penetrated the homeland during the course of the war. Japan accepted defeat while possessing more than two and one-half million combat equipped troops and 9,000 kamikaze planes in the home islands.

United States strategy contemplated an invasion of the home islands, with landings on the southern island of Kyushu scheduled for November 1945. Honshu was to be invaded the following March, even though many American commanders, mostly air officers, stated as early as May 1945 that air attacks would make an invasion unnecessary.

Evidence supports the conclusion that the B-29 offensive, more than any other factor, forced the issue. By August 1945, the XXI Bomber Command had destroyed a high percentage of Japanese industry, wrecked her economy, and shattered the morale of her people. ***In 1945, the XXI Bomber Command comprised the sole force capable of a sustained and continuous attack upon the Japanese homeland.***

The XXI Bomber Command was activated at Smoky Hill Army Air Field, Kan., on March 8, 1944. Soon afterward, the Command Headquarters moved to Colorado Springs to bring together the headquarters of the Command, its three wing headquarters, and Second Air Force. The latter was supplying the cadre of personnel, fillers, and replacements.

By June the Bomber Command was comprised of three wings. The 73d Bomb Wing (VH) consisted of four Bomb Groups: the 497th, 498th, 499th, and 500th. In the 313th Wing were the 6th, 9th, 504th, and 505th Groups. The 314th Wing was made up of the 19th, 29th, 39th, and 330th Groups. Two additional wings joined the Command in the Marianas. The 58th—first wing to use the B-29 in combat from bases in India and China—arrived on Tinian in April 1945. In this wing were the 40th, 444th, 462d, and 468th Bomb Groups. The 315th Wing, the fifth to join the Command, flew its first combat mission on June 26, 1945. It consisted of the 16th, 331st, 501st, and 502d Groups.

The summer months of 1944 were arduous. Washington was pressing for combat readiness in a minimum of time. The B-29, however, was the largest and most complicated aircraft produced to that date, and there were problems. From October 1943 to September 1944, the in-commission rate never exceeded forty percent at any time. During July 1944, the Command in-commission rate for the B-29 was twenty-seven percent, and in August only thirty-six percent, while the average monthly hours flown per aircraft assigned in July was 2.8, and in August 3.6 hours.

By October 1944, XXI Bomber Command units were spread from Colorado Springs to the Marianas, though most of the combat aircraft still were in Kansas and Nebraska. The movement of thousands of men, hundreds of aircraft, and tons of materiel was an exacting, complicated, and difficult task. Total strength had now reached 43,000, with 8,000 in the headquarters and related units,and 11,500 men in each of the three wings.

The first B-29 to reach the Marianas was Joltin' Josie, The Pacific Pioneer, which landed on Saipan October 12, 1944, with General Hansell at the controls. Brig. Gen. Haywood S. "Possum" Hansen, Jr., had assumed command of the XXI on August 28. He had been Chief of Staff of the Twentieth Air Force in Washington and was given the task of leading the Bomber Command overseas and directing its initial missions against Japan. Soon to follow were elements of General O'Donnell's 73d Wing, which would fly fourteen combat missions before the second wing entered the fray. Total B-29 hours per crew averaged only 108. Six shakedown missions were flown by the 73d soon after its arrival at Isely Field, Saipan, against submarine pens on Truk and Iwo Jima. These missions furnished the crews needed experience in navigation, bombing, radar approach, formation flying at altitude, and night landings. The bombing results were unsatisfactory.

The 73d needed more training, but General Arnold ordered the first strike against Japan itself.

A Period of Trial

From this first mission on November 24, 1944, until the revolutionary change in tactics on March 9, 1945, was a time of trial and error, of frustration and dejection. Maintenance equipment and supplies were lacking. Flight personnel and maintenance technicians were green. Information on Japanese targets was scanty. Bomb loads were often limited to three tons because of excessive fuel consumption. Missions were flown every fourth to sixth day, depending on weather, and during December, January, and February missions were flown on only eighteen days. All of these factors meant an exceedingly high non-effective rate of aircraft airborne and a low rate of combat effort. For the three-month period, the monthly average was fifty-eight hours per aircraft and forty-four hours per crew.

The effectiveness of Bomber Command operations could be measured in two ways—first, by the bomb tonnage carried to Japan, and secondly, by how much of this tonnage hit primary targets. In both critical areas, the Command fell short of all expectations.

A target system issued in November listed the following priorities: (1) Japanese aircraft industry, (2) Japanese urban industrial areas, (3) Japanese shipping. Seven of the ten primary targets were aircraft and engine factories. Lower on the priority list were coke, steel, and oil. When weather or other conditions made it impossible to bomb any priority targets, the Command was directed to radar bomb specific port and urban areas.

Throughout this early period the Command adhered to the time-honored Air Force doctrine of high-altitude, daylight, precision bombing. Although successful in Europe, this approach failed to achieve significant results after three months of continued operations against Japan.

Much had been expected from the B-29, but not much was being obtained. On January 6 General Arnold sent Brig. Gen. Lauris Norstad to Guam to inform General Hansell that a change was coming. It came on January 20, when Maj. Gen. Curtis E. LeMay assumed command of the XXI. The thirty-eight-year-old general had earned a reputation as a hard taskmaster with the 3d Air Division in England.

PHOTO: *"Possum" Hansell, who flew first Superfort to Saipan in October 1944, had been named XXI Bomber Command chief while units were still training in US. Here he indicates target zone for first mission from Marianas.*

LeMay carne to his new post from XX Bomber Command and went to the Marianas as a top combat commander. He emerged from the war as a brilliant air strategist.

General LeMay immediately ordered a rigid training program. For combat crews, this consisted of classroom instruction, supervised line maintenance, mission planning and briefing, physical training, dinghy drills, instrument training, and lead crew tactics. The mission critique was begun on February 5. Wing commanders and their staffs met with General LeMay and his staff following each strike to discuss problems, including possible changes to the approved tactical doctrine.

These training programs, together with increased experience, showed significant results. In November 1944, only twenty percent of the airborne aircraft bombed the primary target, and twenty percent failed to bomb any target. In March 1945, eighty-five percent bombed the primary target, and in July the percentage climbed to ninety-four percent.

PHOTO: *After brilliant combat leadership in Europe, and a short tour in charge of XX Bomber Command in the CBI, Maj. Gen. Curtis E. LeMay assumed Command of the XXI Bomber Command in January 1945 and molded it into a powerful destructive force.*

From Fire Bombs to Atomic Bombs

The third phase began on March 9, 1945. From March to the termination of hostilities on August 14, the B-29 strength in the Marianas increased from less than 400 to 1,000. Command personnel on Guam reached 37,500, on Tinian 26,500, on Saipan 12,700, and on newly captured Iwo Jima 13,000.

This period was one of tremendous success. **Those who had held to the belief, even in darker days, that the B-29 could force Japan to surrender before a land invasion were vindicated.** The speed with which the Command was transformed from near impotence into an instrument of devastating power was alarming, both to the Japanese and to many within our military services.

A key factor was the change in tactics inaugurated by General LeMay and applied in the great incendiary attacks upon Japanese cities, which began in force on March 9, 1945. **Although LeMay consulted with his top commanders, he alone was responsible for the final decision to adopt this drastic change to unproven combat tactics**. From high-altitude, daylight, precision bombing in formation, the switch was made to low-level,

area bombing during hours of darkness.

Eight principal factors influenced the decision: (1) previous bombing tactics had produced unfavorable results; (2) winds and cloud coverage prevented satisfactory visual bombing from high altitudes; (3) by March 1945, Japanese fighter interception had decreased substantially; (4) by March, the strength of the Command had increased to three combat wings; (5) it was believed that enemy resistance would be lessened by night attacks; (6) a change to low altitude would greatly extend the life of the engines, which averaged only 264 hours between overhauls; (7) much less fuel would be consumed, thus permitting greater bomb loads; and (8) the target system itself dictated a change.

Concerning the last mentioned factor, reports continued to show that Japan's industry depended on the combined production of thousands of small subcontractors and workshops manufacturing essential component parts, each employing only a few people. This type of industry was meshed into the urban areas of Japan, and was extremely vulnerable to widespread incendiary destruction. Since the urban industrial areas were highly congested and inflammable, their destruction would critically dislocate the labor force.

General LeMay decided to launch a series of low-level incendiary night attacks against Japan's four principal cities—Toyko, Kobe, Nagoya, and Osaka. The four cities were to be attacked individually every second night, to prevent effective low-level defense. Five attacks took place in ten nights, with Nagoya being hit twice. Tokyo was chosen for the first strike. These ten days represent a maximum effort seldom equaled in the history of airpower.

An important change in tactics involved the decision to attack individually rather than in formation. Another significant change was the decision to carry no ammunition in this first great raid. It was believed that one of the greater dangers on a night mission by individual aircraft might be self-inflicted damage. It was found that there were only four night-fighter units in the Japanese Air Force, and only two of these were stationed in the home islands. As a result, on the Tokyo attack of March 9, not a single round of ammunition was carried in the B-29s. In succeeding missions, the amount of ammunition varied, since the Japanese would have soon learned that none was aboard and pressed their attacks.

Each B-29 could carry forty E-46 bomb clusters. Each cluster, exploding at 2,500 feet, would release thirty-eight M-69 incendiary bombs, which would fall in a random pattern. The resulting pattern from one aircraft with an intervalometer setting, or spaced bomb fall, of fifty feet would cover .025 square miles. With a full bomb load of 17,000 pounds, the area burned by a single aircraft could be approximately sixteen acres. In this memorable ten-day period, beginning on March 9, the Command's three wings sent 1,595 B-29 sorties against the four major cities, unleashing 9,365 tons of incendiaries from an average altitude of 7,000 feet.

Thirty-two square miles of highly populated and industrialized area were destroyed. In the devastating raid upon Tokyo on March 9, 15.8 square miles were burned, with the loss of only one B-29 to enemy action. The phenomenal success of the new tactics restored the morale and fighting spirit of the Command's crews by providing a degree of battle success proportionate to the effort expended. Especially important, the B-29 was established as a reliable and efficient combat aircraft.

After the March raids Japanese opposition steadily declined. It became the exception when B-29s met heavy opposition over the target. Flak and searchlight defenses continued to be strong in the Tokyo area but were comparatively weak elsewhere. Under the brilliant leadership of General LeMay, together with Brig. Gens. Roger Ramey, Emmett O'Donnell, John H. Davies, Thomas Power, and Frank Armstrong, his wing commanders, the XXI Bomber Command, by March 1945, was inflicting heavy and continuous devastation upon the home islands.

Incendiary Operations

Sixty-one percent, or 96,480 tons, of all bombs dropped by the B-29s upon Japan were incendiaries. The scope and complexity of these attacks were the most impressive in the history of aerial warfare. Seventy-nine major missions hit sixty-four principal cities, involving 13,365 aircraft sorties and causing nearly one hundred percent building damage in a total area of approximately 175 square miles, practically all in the very center of the cities.

General LeMay said later: *"Due to the nature of Japanese construction, the vast majority of targets were highly inflammable and ideal for incendiary attacks. It was a classic situation, one that airpower exponents since the days of Douhet had looked for as a stage to prove their concepts."*

The most devastating single raid was the March 9 attack upon Tokyo. There were six strategic targets within the primary area, the most important being the Hattori Company, which manufactured fuses for artillery shells. Each major factory was surrounded by a 100-foot firebreak and home industry was highly concentrated within this area. Most of the people living in the zone worked either at the factories or supported them in their homes. Ninety-five percent of the homes and factories in the area were made of wood.

XXI Bomber Command Field Order No. 43 directed the 73d, 313th, and 314th Wings to participate. All crews were to make individual runs on the target at night at altitudes ranging from 5,000 to 7,800 feet. Three hundred and twenty-five B-29s took off from the Marianas, and 279 dropped 1,665 tons of bombs onto the primary zone. Fourteen aircraft were lost to all causes, and 102 crew casualties were recorded-3.1 percent of those airborne. Visual bombing was accomplished by 125 crews, radar bombing by 149, and five crews bombed on the lead aircraft. This was also the first combat mission for the 314th Wing. Bombing results were considered superior.

Japanese air opposition was weak, with seventy-four fighters making only forty attacks. Flak was accurate and intense but diminished as the attack progressed. Japan's defenses were proven to be extremely weak.

A fifty-mph wind, plus the highly combustible nature of the city, resulted in a fire that was out of control within thirty minutes after the first 13-29s dropped their bombs. Police records showed that 267,000 buildings were destroyed, about one-quarter of Tokyo.

PHOTO: *Taken through the nose of a Superfortress, shows incendiary bombs from two Boeing 8-29s dropping on a Japanese target, each with the pyrotechnic force of ten gallons of flaming gasoline. Such raids destroyed sixty-three percent of Tokyo's commercial area.*

The fires were still burning by mid-morning, and had it not been for the river, which made a natural firebreak, they might have continued much longer. Aerial photographs showed a burned-out area of 15.8 square miles. Eighteen percent of the industrial area and sixty-three percent of the commercial area were destroyed. Command intelligence officers deleted twenty-two numbered industrial targets from their priority lists.

The ten-day fire blitz of March was a turning point. The morale of the Japanese people began a steady decline, never to rise again. Industries suddenly ceased to exist, or operated at greatly reduced rates. The panic-stricken people began an exodus from the major cities. The rate of absenteeism in the war industries recorded an alarming rise. The population of Tokyo dropped from over five million on January 1, 1945. to two and one-third million on August 1.

In Tokyo, only four incendiary raids completely destroyed 51.3 square miles of industrial urban areas. Kobe, a city comparable to St. Louis, lost fifty-one percent of its industrial area in only three raids. Osaka, industrially similar to Pittsburgh, was Japan's second city in population, and second to Tokyo as an industrial and transportation center. In three incendiary attacks, one-fourth of its area was destroyed. Nagoya, a city of a million and a half, produced half of Japan's aircraft and engines, plus machine tools, ball bearings, and tanks. Incendiary attacks destroyed one-third of its industrial urban area.

Practically all incendiary bombs in the Marianas were expended in the ten-day blitz. Consequently, there were no incendiary missions from March 19 to April 13. Then three incendiary strikes occurred, again followed by a pause in fire raids until May 14, due primarily to the Command's strikes against Japanese airfields in support of the Okinawa invasion. On May 14, 529 bombers were airborne in the first daylight incendiary raid, the

first strike in which all four wings struck the same target, the north urban area of Nagoya. **This was the largest force sent against Japan to date.**

The fourth bomb wing to join the Command was the 58th. It flew its first mission from West Field, Tinian, on May 5, 1945. Although a latecomer to the Marianas, the 58th was no neophyte. It had been the combat element of the XX Bomber Command, which had been hastily sent to India by General Arnold in 1944. Staging from bases in China, it flew its first mission against Bangkok on June 5 of that year. Its final mission from China was flown on March 30, 1945, against Singapore.

June 1945 saw the tempo of the fire raids stepped up. The Command released a total of 20,559 tons of incendiaries in fifteen missions, numbering 3,203 sorties. Principal targets were Tokyo, Osaka, Kobe, Sasebo, and Fukuoka, but as the destruction of these major centers became more complete the Command turned toward secondary targets. When 444 B-29s attacked Osaka on the fifteenth, not one Japanese fighter rose to the attack and the Japanese never again sent up a fighter defense of any consequence.

July was the last full month in the war, and on July 16 the XXI Bomber Command was re-designated the Twentieth Air Force under Lt. Gen. Nathan F. Twining. **It was evident to most of our air generals that the war was rapidly coming to an end.**

General Twining has said: "*Upon my arrival in Guam to assume command of the Twentieth Air Force on July 2, 1945, I spent considerable time studying the photographs of the B-29 bomber offensive against the Japanese islands—particularly their war sustaining resources, industry and oil. It was readily apparent from the bomb damage photos, and we had many of them, that the Japanese resources for continuing a war were practically nil. This information was known to General Arnold in Washington who presented it to our top decision-making people. But in spite of this the decision was made to continue on with the plans for the invasion of Japan.*"

Precision Bombing Operations

From the beginning of March to the end of the war, a little more than twenty percent of the Command's combat effort was devoted to high explosive bombing of priority industrial targets, usually by daylight formation attacks. Targets included installations of the aircraft industry, arsenals, oil, chemical plants, and in the latter months of the war, with the land invasion in mind, transportation facilities.

In precision bombing, weather was the dominant factor. When conditions permitted visual sighting, the results were usually satisfactory. The weather over japan was usually not favorable for visual daylight attacks, however, and there were attempts to employ precision bombing at night, using flares. Results were discouraging. The light from the flares was reflected by either the clouds or smoke and hindered rather than helped the bombardiers. The Command decided to draw on the techniques used by the Royal Air Force and await arrival of RAF 1,000-pound, target-identification bombs. Reflex optic bombsights, better for this type of bombing, were ordered.

By May, the Command was achieving acceptable results. Crews were gaining in experience. The weather improved. **Flying at low altitudes eliminated winddrift problems. This combination resulted, for the first time, in more than fifty percent damage to precision targets.**

Mission No. 232, flown on the night of June 26, was the first combat mission for the 315th Bomb Wing, the fifth and the last wing to join the Command. Its B-29s carried a new radar, **the APQ-7**, designed specifically for radar bombing, and were unarmed, except for tail guns, permitting a much larger bomb load. The 315th was given the task of destroying Japan's oil industry; since many of the large refineries were on the coast and easily identified by radar. Fifteen missions were flown against this complex. Using radar for ninety-five percent of their bombing, the wing destroyed most of the major oil refineries and more than six million barrels of storage-tank capacity. The total cost was three aircraft lost and thirty casualties.

PHOTO: *Framed in wreckage of a Japanese blockhouse destroyed %hen US forces conquered Saipan after bloody fighting are Superfortresses of the 20th AF. Capture of the Marianas in 1944 gave B-29s the bases they needed to hit Japan.*

Japanese opposition became so insignificant by late July that General LeMay announced in advance to the Japanese which targets would be hit and warned the people to evacuate. On July 27, more than 60,000 pamphlets were dropped on eleven cities. Japanese officials later admitted that these pamphlets frightened thousands from their jobs and homes.

Tactical Operations and Mine-laying

Another requirement imposed upon the XXI Bomber Command was the tactical operations against airfields on the southern Japanese home island. These attacks, conducted from April 17 to May 11, 1945, were deemed necessary to protect our naval forces off Okinawa. The B-29s flew ninety-five tactical missions, dropping 8,116 tons of fragmentation and general-purpose bombs. Twenty-three B-29s were lost. More than 350 Japanese aircraft were destroyed or damaged on the airfields and 208 in the air. The mine-laying operation was going on at the same time. General Twining has called it a most essential element in the air offensive. He further stated that it demonstrated for the first time that airpower could carry the brunt of a strategic blockade of a powerful

maritime nation. Fleet Admiral Chester Nimitz said the mining campaign accomplished phenomenal results. **Never before had such an operation been undertaken on such a scale and with so bold an aim.** The aerial mining campaign hit at Japanese dependence on imports to supply her factories and feed her people. In the last five months of the war, more than 1,250,000 tons of shipping were sunk or damaged by B-29-sown mines, more than by any other agent, including submarines. Yet the mining campaign represented less than six percent of the total sorties flown during the last five months of the war and involved only one wing, the 313th.

Cooperation between the Bomber Command and the Navy was excellent. The Navy designed, supplied, and serviced the mines. The final results are a tribute to both services. Prince Konoye evaluated the B-29 mining campaign as having had an over-all economic effect comparable to the bombing and incendiary attacks. Captain Tamura of the Japanese Navy said in an interview after the war that the B-29 mining was so effective that he believed the war could have been shortened had the operation begun earlier.

Effects on Japanese Morale

Once the B-29 raids began, and as they increased in size and frequency, Japanese propagandists found it impossible to hide the true state of affairs from the people. A committee, which studied Japanese morale states:

". . . *The air raids brought the war home to the Japanese people, psychologically as well as physically, and made them realize as nothing else could that the mere factor of geographic remoteness does not ensure a nation against the terrible consequences of modern air warfare*."

To this, a city official in Sakai added: "*As raids increased, the fighting spirit decreased because people were tired and frightened. Also, the desire for peace increased and work capacity was lowered*."

The conviction spread that continued resistance was futile. In particular, the extension of the bombing to the secondary cities convinced the people that the B-29s could, and would, destroy every city in Japan. Also, they were made painfully aware of the impotence of their own government to prevent destruction or even to minimize its effects.

An important secondary result was the widespread and disruptive evacuation from the cities. City dwellers dispersed throughout the nation and spread the word of Japan's weakness by their words and by their actions. The mass exodus began after the incendiary attacks on Tokyo in March, when approximately two million people lost their homes. More than 8,500,000 persons fled from the cities. Fully one-third of these evacuees had been engaged in war production. Another aspect of B-29 operations,

which affected morale, was the dropping of leaflets to announce future raids. The manager of a large factory in Nagaoka said: *"The leaflets had a great effect on the morale of the people. They figured that if the enemy could announce a raid beforehand, the enemy was superior."*

PHOTO: *Waiting for the return of the first aircraft to carry an atomic bomb on a combat mission, the B-29 Enola Gay, are Gen. Carl A. Spaatz and staff, together with Rear Adm. W. R. Purnell (far left), and Brig. Gen. Thomas F. Farrell (in front of Admiral Purnell). The Enola Gay took off from the B-29 base on Tinian on August 6, 1945, on its mission to deliver a nuclear strike against the Japanese city of Hiroshima.*

The Atomic Bombs

The B-29 Enola Gay, with Col. Paul Tibbets as aircraft commander, appeared over Hiroshima at 8:15 on the morning of August 6. Its single bomb took forty-seven seconds to descend prior to its violent explosion. An area of 4.4 square miles was completely obliterated—sixty-nine percent of the urban area. The same destruction would have required 210 B-29s, each carrying ten tons of conventional bombs. Nagasaki, the second city to fall victim, had experienced only five small raids in the preceding twelve months. The impact of the A-bomb here was less shattering than at Hiroshima. The scale of destruction was greater, but the actual area destroyed was smaller due to the terrain, and the point of fall of the bomb. **The two A-bombs were dropped from B-29s of the 509th Composite Group, which had trained at Wendover Field, Utah, and was based at North Field, Tinian, on May 1, 1945.**

Whether or not these two weapons were the decisive factor in causing the surrender within the week is a moot point. General Twining said: *"I am convinced that the surrender would have occurred within a short time period even if the atomic bomb had never been used."*

General LeMay agrees with this view. He stated: *"The atomic bomb certainly expedited the collapse; however . . . I think it was anticlimactic in that the verdict was already rendered."*

The fact remains that the atomic bombs were a facet of airpower. Whether the atomic bombs or the massive raids prior to August 6 had forced Japan to seek peace, it was the B-29 offensive, which finally brought about the decision.

An Evaluation

The impact of the B-29 attacks upon the Japanese urban social structure was calamitous. Those cities spared from direct attack shared the experience of millions of refugees who fled into the country seeking food and shelter. The raids brought a fundamental realization that there was no defense against the B-29, and, worse, that nothing could prevent the destruction of every inhabited area of Japan.

As the B-29 attacks increased in number and intensity, the people grew progressively more short-tempered a outspoken in their criticism of the government, the war and affairs in general.

No nation can long sustain an aggressive war effort without the full cooperation and determined will to win on the part of the people. These elements were lacking in Japan in the summer of 1945, and airpower was the principal cause for this apathy. The Japanese said of the B-29 that:

- It was the most important single factor in causing them to have doubts of victory.
- It was the most important single factor in causing them to feel certain of defeat.
- It was the most important single factor in making them unwilling to continue the war.
- It was the greatest single cause of worry during the war.

A look at the final results achieved by the Twentieth Air Force to August 14, 1945, shows that:

- One hundred eighty square miles of highly industrialized urban areas were burned to the ground. The industrial productive capacity of sixty-one cities was destroyed, and twenty-one million Japanese people were displaced.

- Six hundred and two major war factories were destroyed or severely damaged, excluding the thousands of small feeder factories destroyed.
- A total of 159,862 tons of bombs were dropped on Japanese targets, including a daily average of 1,193 tons during the final three months.
- One and one-quarter million tons of Japanese shipping were destroyed by aerial mines.
- A total of 33,047 bomber sorties were flown against Japan.
- Some 470,000 barrels of oil and oil products, 221,000 tons of foodstuffs, and two billion square yards of textiles were destroyed.
- In twenty Japanese cities, 100 percent of the planned target area was totally destroyed, seventy-five to 100 percent of the planned area in eighteen cities, and from fifty to seventy-five percent in thirteen cities.
- Based on figures before the attacks, production in key industries had decreased by the following:
  Oil refineries 83 percent
  Aircraft engine plants 75 percent
  Airframe plants 60 percent
  Electronics and communications equipment plants 70 percent
  Army ordnance plants 30 percent
  Light metals 35 percent

Credit must also go to the B-29 gunners, who destroyed 714 Japanese aircraft, probably destroyed 456, and damaged 770. The campaign was not without its price. From the beginning of combat operations on November 24, 1944, to August 14, 1945, the Twentieth Air Force operating from the Marianas lost 447 B-29s and 624 crews. Of these, 343 aircraft, or 1.2 percent of those airborne, and 243 crews, or 0.8 percent of those airborne, were lost in combat missions. During the entire period, eleven percent of the aircraft over the target were lost or damaged. Japanese fighters accounted for thirteen percent of all battle damage, seventy-six percent was due to flak, nine percent was charged to both, and two percent was self-inflicted. In addition to these combat operations, the Bomber

Command also flew 480 photo reconnaissance sorties, 755 weather reconnaissance and leaflet-dropping missions, 248 radarscope missions, and 134 search sorties for missing crews.

As the war entered the first week of August 1945 and Japan lay battered and charred from southern Kyushu to northern Honshu, preparations were still being made in Washington and in the Far East for an amphibious invasion. The advice of our top air commanders was often ignored, for they were convinced that Japan would surrender prior to November 1.

Actually, the true capability of the B-29 was never fully recognized, except by the air officers, and was not given adequate weight in the plans established for the war against Japan.

The B-29 campaign was conceived, in effect, as a means to an end, namely invasion, rather than as a decisive force within itself. Few officers outside the AAF believed otherwise.

Ten weeks remained from the time the Japanese did surrender until the scheduled date of the Kyushu invasion. Consider the state of social and economic collapse existing in Japan at the time of surrender, and associate this with the size of the B-29 operations to that date. *The Twentieth Air Force was in a position, by August of 1945, to deliver a bomb tonnage upon Japan in the next eleven weeks equal to its entire effort to that time, even if additional atomic bombs were not used.*

The United States owes much to Generals Twining and LeMay for their superb performances. General LeMay must be given special recognition. It was he who assumed command of the XXI at a time when its performance was poor and its achievements were negligible. It was due in large measure to his leadership, discipline, and brilliant strategy that the Command became the most formidable force of destruction that the world had ever seen.

The United States likewise owes much to the officers and men of the XXI Bomber Command and the Twentieth Air Force. Two and one-half million combat-equipped troops and 9,000 kamikaze planes were ready to meet our invading armies on the beaches of Kyushu and Honshu.

There is little to add to the final address by their commander, General Twining, who said after the final mission had been flown on August 14, 1945: "*That day marked the closing of a record of achievement that is unparalleled in the history of the Army Air Forces. That the Twentieth Air Force was able to undertake and so decisively accomplish its mission within a very short span of time is a tribute to those who designed and produced its weapons, to the courageous airmen who by their ingenuity and training established the combat effectiveness of those new weapons, and to the ground personnel who were unstinting in their efforts to support the combat force.*"

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