

THE COMBINED ALLIED BOMBING OFFENSIVE
AGAINST THE GERMAN CIVILIAN, 1942-1945

A Thesis

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'Air power can be used as an independent means of war operations. Nobody that witnessed the attack on London on 11 July could have any doubt on that point. Unlike artillery, an air fleet can conduct extensive operations far from, and independently of, both army and navy. As far as can at present be foreseen there is absolutely no limit to the scale of its future independent war use. And the day may not be far off when aerial operations with their devastations of enemy lands and destruction of industrial and populous centres on a vast scale may become the principal operations of war, to which the older forms of military operations may become secondary and subordinate.' ¹

GENERAL SMUTS-REPORT TO THE BRITISH
GOVERNMENT CONCERNING POSTWAR ORGAN-
IZATION OF THE R.A.F.-August 17, 1917

'Indiscriminate attack on civilian populations as such will never form part of our policy.' ²

AIR COMMODORE SLESSOR-DIRECTOR OF PLANS-
ROYAL AIR FORCE-September 7, 1939

¹Air Marshal Sir Robert Saundby. Air Bombardment (London, England: Chatto and Windus, 1961), pp. 23-24.

²Sir Charles Webster and Noble Frankland. The History of the Second World War: The Strategic Air Offensive Against Germany, 1939-1945 (London, England: Her Majesty's Stationery Office, 1961), I, p. 135.

PREFACE

This thesis was undertaken as a preliminary inquiry into one aspect of the study area about which I intend to conduct further research. Ultimately, I hope to come to an understanding of the processes whereby the various policies of bombing civilian populations in the Twentieth Century were derived and the strategic significance of the effects that were produced in each case where such a policy was practiced. Toward this end, my future research will consider the various instances during the Twentieth Century when this strategy of bombing was utilized. This Master's Thesis examines the Allied policy of bombing German civilians during the Second World War.

The organization of this thesis is structured around the assumption that the problem of the Allied bombing of German civilians can be meaningfully regarded as a "historical system". Each section of this thesis considers some particularly important aspect of this historical system. This method or approach is analogous to using a microscope to observe some system of life. With each change of magnification, the microscope reveals a whole new range of activity and reality that is of integral importance to the constitution and behavior of the system being observed. Similarly then, each section and chapter of this Thesis constitutes essentially a change in magnification.

In Part I, this thesis attempts to provide a concise perspective on the general reality surrounding the Combined Allied Air Offensive Against Germany. By discussing bomb tonnage allocation to different target systems, bombing directives and strategies, an attempt is made to illustrate the approximate percentage of the total Allied bombing effort that was actually devoted to city attacks, as well as to prove unquestionably that the aiming point of these attacks were mainly German city centres and their urban populations. In chapter II the strategic thinking developed to rationalize the Allied bombing strategy is considered. In addition, this chapter attempts to provide a brief explanation of the possible reasons for the obvious differences between the British and American bombing policies executed against Germany. Part II, in considering the effects of the Allied air offensive against the German civilian, attempts to investigate the most microscopic realm of this topic. Chapter III initiates this magnification of perspective by discussing generally the quantitative destruction produced by Allied raids as measured in square miles and acres of built-up areas destroyed in German cities. As the chapter progresses the perspective is increasingly magnified so that the focus is more specifically on the personal nature of the destruction effected by the Allied raids. Since the destruction of residential housing was one of the stated goals of the British offensive, a discussion of the extent of the destruction wrought upon this target system is considered. This is followed by an attempt to characterize and evaluate the city centre attacks in terms

of their indiscriminate nature. This discussion is again resumed in the following chapter after an attempt is made to estimate the number of fatalities the bombings produced among the civilian population as well as to estimate in what proportion they occurred between men, women, and children. Part III considers the effects that civilian bombings managed to produce and the ultimate impact these effects had upon the German war effort. Chapter VI in this section considers the degree to which the bombings produced aberrant behavior in individual civilians as a consequence of either psychological or physiological causes. The following chapter discusses the possible effects the Allied offensive had upon civilian attitudinal and behavioral morale as measured by the United States Strategic Bombing Survey investigators. In this chapter are discussed the degree of change produced in German morale during the course of the war, the factors that were of importance in effecting this change in morale and their relative significance. Chapter VIII investigates the extent to which the Allied city raids served to undermine German production and ultimately the German war economy. Part IV views the Allied policy of bombing German civilians in retrospect: attempting to provide an evaluation of the data considered in the text of this thesis. To avoid leaving the reader with the mistaken impression that there was a simple and absolute distinction between British and American bombing policies in World War II, Appendix I has been included in this thesis. Its content is sufficiently different to warrant its inclusion among the Appendices rather than in the text itself. The data

contained therein provides a perspective of the American air offensive against Japanese cities. The content of all these chapters when considered simultaneously should constitute an intelligent (but by no means complete) perspective of the system of reality underlying the Allied policy of bombing German civilians during the Second World War.

The source material used almost exclusively in this study was derived from a series of some 205 independent reports made by the United States Strategic Bombing Survey at the end of World War II. Numerous secondary sources were consulted as well. However, since it was consistently discovered that these Survey reports constituted the ultimate data pool from which our knowledge of this problem originates, it seemed expedient to use them directly as the basic elements around which this study was structured. Where I encountered a reference to the U.S.S.B.S. reports in another source that was of interest to this study, I consulted the specific Survey report directly to insure no data had been abridged (which was frequently the case) and I used the Survey source as my footnote reference.

Since the U.S.S.B.S. reports are such an important source for anyone interested in some aspect of the air offensive and because they constitute such an important source for this thesis some brief remarks are appropriate concerning their origin, purpose and quality. The United States Strategic Bombing Survey was initiated in September of 1944 by President Roosevelt to investigate seemingly every aspect of the Allied air attacks against both Germany and Japan. Pursuant to the

presidential order, 300 civilian specialists, 750 military officers and 500 enlisted men were organized to form the components of the Survey. The U.S.S.B.S. investigators moved into Germany with the advancing Allied infantry units and began immediately to evaluate the results of Allied bombing.¹

It is not surprising when one considers the large number of independent studies being conducted simultaneously and the complexity of the problems under consideration, that there were obvious differences of opinion regarding estimates and conclusions deduced by different Survey reports. As one reads the different reports data seldom appears twice in exactly the same form. Bomb tonnage figures are characteristically in error of each other, and casualty estimates can vary as much as 200 percent depending on whether the given report has estimated the minimum, maximum or realistic number of casualties. What is even more frustrating is that some reports fail to explain exactly what their estimates mean or how they were derived. These difficulties are a problem not unusual to historical sources, however, and they should certainly not obscure the usefulness of these documents to the historian. Seldom, if ever, has there been such a specialized, expertly organized, and objective study of a historical problem.²

¹Sir Arthur Harris. Bomber Offensive (London, England: Collins Press, 1947), p. 259.

²Alan S. Milward. The German Economy at War (London, England: The Athlone Press, 1965), p. 5.

The fact that there are errors and disparities in these documents merely reminds us that we are dealing in the realm of history rather than in that of science.

Having briefly described the intent, purpose and composition of this thesis, it is now appropriate to acknowledge those individuals to whom I owe a debt of gratitude for their assistance to me in writing this study. Such an undertaking is a challenging one for me because I feel all the persons who encouraged and facilitated my academic career deserve mention. I begin by offering my thanks to Dr. Lessing Nohl of American River College and to Mr. Robert Moore of Mira Loma High School (both in Sacramento, California) for having acted as the catalysts in my mental development. I owe a special debt of thanks to Dr. Nohl for having been the inspiration for my interest in historical study. To Dr. George Baer and to Dr. G. William Domhoff, both of the University of California at Santa Cruz, I owe many thanks for their patience and contributions to my intellectual development and academic career.

At the University of Manitoba, I have been fortunate to have had the support and encouragement of three professors who are the sole reason for my having continued with my graduate studies.. Dr. Tom Carney, Dr. John Kendle and Dr. Fred Stambrook constantly uplifted my own sagging morale. It was as a consequence of their encouragement and guidance that this study came to a successful end.

Nearly three-quarters of the source material that appears in the bibliography of this thesis was not in the stacks of the University of Manitoba Dafoe Library. The staff of the Inter-library Loan section of the library obtained for me nearly all of this critically important material. Unless the reader has conducted research in this manner, he hardly realizes the debt of thanks due these ladies. The acquisition of each source material means filling out numerous forms and mailing an infinite number of letters before the material can be located and procured. The ladies did this without complaint and systematically informed me when portions of this data arrived. This study would never have been possible without their assistance.

Finally, I must acknowledge the immense support my parents have so unselfishly given me throughout this academic year. During the most difficult of personal, financial, and professional circumstances of my life, they provided me whatever support was required. Without their morale and financial aid, this study as well as my academic career, would have been impossible to pursue. To them I owe the most unqualified acknowledgement of all.

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PART I

THE COMBINED ALLIED BOMBING OFFENSIVE
AGAINST THE GERMAN CIVILIAN: GENERAL
BACKGROUND INFORMATION

CHAPTER I

THE GERMAN CITY AS A TARGET SYSTEM

During the Second World War the Allied Air Forces (exclusive of the Soviet Air Force) released approximately 1,986,423 tons of bombs on targets in the European theatre of operations. Of this amount, 676,846 tons (34 percent of the total bomb tonnage dropped in the European theatre of the war) were released on cities and towns. It usually comes as a surprise to most readers to realize that the total bomb tonnage released by the Allies on enemy cities exceeds total bomb tonnage released on any other form of target group attacked by the Allied Air Forces during World War II. By way of comparison to the 676,846 tons of bombs released on cities, the Combined Allied Air Forces dropped only 521,483 tons (26 percent of total bomb tonnage) on transportation targets, 385,549 tons (19 percent) on industrial targets and 402,545 tons (20 percent) on tactical targets.¹

The concentration of bomb tonnage that the Allied Air Forces devoted to the city target system was, however, even greater than these statistics suggest. Of the 1,986,423 tons of bombs dropped by the Allied Air Forces in the European theatre, approximately 1,350,000 tons were released on

¹The United States Strategic Bombing Survey. Oil Division Final Report: Appendix (Washington, D.C.: U.S. Government Printing Office, 1947), p. 48a (SEE APPENDIX IV).

German territory.² Using this latter tonnage figure as a reference, the bomb tonnage specifically aimed at German cities (542,554 tons of bombs³) amounts to 40 percent of the tonnage released on Germany proper. It is interesting in this regard to note that prior to May, 1944, the percentage of bomb tonnage aimed at city targets amounted to as much as 53 percent of the total tonnage Allied Air Forces released on Germany.⁴ It should be evident from this data that the German city was indeed a major, if not primary, target system of Allied air attack during the last World War.

R.A.F. VERSUS U.S.A.A.F. TARGET PREFERENCES

The Royal Air Force and the United States Air Force each had their separate bombing policy. Both air forces had their strong preferences for specific types of target systems. For this reason, each was responsible to a different degree for the extent to which each of the separate target groups cited in the first paragraph was bombed. The Royal Air Force, for example, aimed 544,860 tons of bombs (55 percent of the bomb tonnage it dropped in the European theatre) at cities and towns, 141,844 tons of bombs (14 percent) at industrial targets and 139,078 tons of bombs (14 percent) at transportation targets.⁵

²U.S.S.B.S., Summary Report (Pacific War) (Washington, D.C.: U.S. Government Printing Office, 1946), p. 16.

³U.S.S.B.S., Area Studies Division Report (Washington, D.C.: U.S. Government Printing Office, 1947), p. 3.

⁴U.S.S.B.S., Oil Division Final Report, p. 123.

⁵U.S.S.B.S., Oil Division Final Report: Appendix p. 48a.

In marked contrast to the bombing policy of the R.A.F., the United States Army Air Force aimed only 131,986 tons of bombs (13 percent of the total bomb tonnage it dropped in the European theatre) on cities or towns. Where the R.A.F. devoted only 28 percent of its bomb tonnage to both industrial and transportation targets, the U.S. Air Force devoted 626,110 tons (63 percent of the bomb tonnage it dropped in the European theatre) to this combined target system. The American Air Force dropped 351,953 tons (38 percent) on transportation targets and 243,705 tons (25 percent) on industrial targets. Clearly, the targets system preferred by the U.S.A.A.F. was the combined transportation/industrial group.⁶

From this overview, it must be obvious to the reader that the British and American components of Allied air power possessed radically opposed bombing doctrines. On the one hand, the Royal Air Force seemed to have the aim of accomplishing the destruction of German cities. This is indicated by the fact that of the 676,846 tons of bombs dropped on cities in the European theatre of operations, the R.A.F., by dropping 544,860 tons of bombs on enemy cities and towns, accounted for just over 80 percent.

In contrast to the R.A.F. bombing strategy, the U.S.A.A.F. devoted the overwhelming portion of its bomb tonnage (63 percent) to attacks on industrial and transportation target groups.⁷ The contribution that the American Air Force made to the destruction of enemy cities in Europe was

⁶ Ibid., p. 48a.

⁷ See Appendix IV.

minor compared with that made by the Royal Air Force. The bomb tonnage that the Americans dropped on cities and towns amounted to merely 20 percent of the tonnage released on cities in the European theatre of the war.⁸

THE GERMAN CITY CENTRE AS A TARGET OF R.A.F. BOMBING

The indiscriminate nature of the Royal Air Force raids on German cities is evidenced by the manner in which the aiming point of a given attack was determined. From a zone map of the city to be bombed, R.A.F. Bomber Command would choose the exact aiming point to which bombers would be directed. Areas within the city that were of residential and administrative composition and between 70 to 100 percent "built-up" were colored with a red perimeter. Those areas of similar composition but with only 40 to 70 percent built-up sections were given a green outline. Industrial areas were outlined in black and major marshalling yards were indicated with a buff colored perimeter. Bombing raids directed against a previously unbombed city were aimed at the 70 to 100 percent built-up area of the city. Subsequent attacks on the same city were aimed at the centre of the most built-up section that remained. Since the major portion of German industry was located in the outer perimeter of a given city, in the least built-up area, industrial targets were not seriously affected by these attacks which fell mainly on the German residential population.⁹

⁸U.S.S.B.S., Oil Division Final Report: Appendix, p. 48a.

⁹U.S.S.B.S., Area Studies Division Report, p. 4.

A popular misconception is that the destruction of civilian life and property in these city raids was an unfortunate and unintentional by-product of the uncertainties inherent in aerial warfare. An example of this line of thinking appears in the book Vertical Warfare, written by Francis Drake. The author asserts that the primary purpose of these city attacks was to destroy the "machine power" of Germany rather than to direct any sort of attack against the German urban population. He does, however, admit that because of the characteristics of R.A.F. area attacks on cities, i.e. because the R.A.F. selected areas rather than specific targets for the aiming point of their raids, there could "never be any guarantee in area bombing that numbers of civilians and non-military objectives will not be destroyed along with the essential targets."¹⁰

The problem with the above perspective regarding R.A.F. attacks on cities is that it has inverted the importance of the objectives or goals behind the strategy of R.A.F. bombing. In actuality, the primary objective of R.A.F. city raids was the destruction of German civilian morale.¹¹ Any destruction of industrial or machine power which resulted while the R.A.F. attempted to undermine civilian morale was regarded as a bonus. While theoretically each of these and other rationalizations for attacking German cities was often confused and indistinguishable from each other,

¹⁰ Francis Drake, Vertical Warfare (New York, N.Y.: Doubleday, Doran, and Company, Inc., 1943), p. 94.

¹¹ Sir Charles Webster and Noble Frankland. The History of the Second World War: The Strategic Air Offensive Against Germany, 1939-1945. (London, England: Her Majesty's Stationery Office, 1961), I, p. 326.

in reality civilian morale was clearly the target at which R.A.F. bombing was aimed.

Of particular interest in this regard is the February 14, 1942 Directive issued to Bomber Command. This Directive specified "the whole of the enemy civil population" as the primary target of R.A.F. attack.¹² It seemed that after this directive was issued there persisted, in the minds of the men who would execute these orders, some confusion regarding what should be the nature of the aiming point of such a bombing policy. To dispel this uncertainty, Sir Charles Portal, Chief of the Air Staff, sent a minute to Air-Vice Marshal Bottomley in which he explained the precise nature of the target system being assigned by the new directive. It read: "I suppose it is clear that the aiming points are to be built-up areas, not, for instance, the dockyard or aircraft factories."¹³ Ultimately, the attacks were to be directed at the most populous and structurally congested areas of German cities. The inevitable result of such a policy was that the aiming point in these attacks was almost invariably the center of German cities.¹⁴

The February 1942 bombing Directive was not replaced until February 1943. This later Directive merely served to confirm the principles of

¹²Ibid., p. 459.

¹³Ibid., p. 324.

¹⁴U.S.S.B.S., Area Studies Division Report, p. 1.

strategy established by the earlier policy.¹⁵ There was no marked deviation from this policy of bombing civilian populations until just prior to the Normandy invasion. During this operation the major part of the R.A.F. bombing effort was diverted to provide tactical support for the invasion forces. Following the invasion, the R.A.F. resumed its air offensive in Germany. However, when the raids were resumed in September of 1944, the target system being attacked had been altered. Top priority was given to the destruction of the oil industry, second priority to the dislocation of transportation, and third priority to the assault on built-up areas.¹⁶ Even so, during the last year of the war, the R.A.F. released 317,767 tons (58 percent of the total bomb tonnage that the R.A.F. released on European cities in the course of World War II) on city targets.¹⁷ The point being developed is simply that the R.A.F. attacks on city center targets was a long-standing practise. It remained, throughout the major part of the air offensive against Germany, the fundamental bombing strategy of the British.

GERMAN WAR INDUSTRY AS A TARGET OF U.S.A.A.F. BOMBING

The bombing policy of the United States Air Force in Europe was the antithesis of that utilized by the British. Instead of attempting to

¹⁵Sir Charles Webster and Noble Frankland, The History of the Second World War: The Strategic Air Offensive Against Germany, 1939-1945, I, p. 324.

¹⁶E. J. Kingston-McCloughry, War in Three Dimensions (Oxford, England: Elden Press, 1949), p. 81.

¹⁷U.S.S.B.S., Oil Division Final Report: Appendix, p. 48a.

destroy the enemy's civilian morale, the U.S.A.A.F. sought to destroy the key components of the German war economy. Six groups of industrial targets had been designated for air attack. These primary industrial target groups included submarine production, the aircraft industry, the ball-bearing industry, and oil production. Synthetic rubber and military transport vehicle production constituted a secondary target group.¹⁸

The Casablanca directive of January 1943 had listed German submarine production, the aircraft industry, transportation and the oil industry as target groups for American bombers. This bombing policy was soon superceded by the June 1943 directive. At this stage of the air offensive, the destruction of Germany's fighter aircraft production was placed in the position of highest priority. The fighter aircraft production target system remained in the top priority position until June 1944. Thereupon, various other target systems (i.e., V-weapon installations and the French railway system) ascended to displace the aircraft industry from its position. Following the invasion, the air offensive against Germany was resumed. During July, 1944, the U.S.A.A.F. concentrated its attacks on the oil industry and transportation. Later directives assigned the tank and motor vehicle industry, transportation, and the oil industry to the highest levels of priority.¹⁹

¹⁸Sir Charles Webster and Noble Frankland. The History of the Second World War: The Strategic Air Offensive Against Germany, 1939-1945, I, p. 15.

¹⁹U.S.S.B.S. The Effects of Strategic Bombing on the German War Economy (Washington, D.C.: U.S. Government Printing Office, 1945), pp. 2-4.

Because of the precise nature of the targets selected for attack by the U.S. Air Force, their bombing technique was necessarily different from the "area attack" technique utilized by the R.A.F. The American Air Force practiced what came to be termed "precision bombing." The comparative accuracy of these two techniques is indicated by research conducted during the war. It was found that in six night attacks on German cities (the R.A.F. generally conducted their attacks at night to minimize their casualties), the British bombers managed to drop only 5.5 percent of their bombs within 1500 feet of the aiming point.²⁰ The U.S.A.A.F., however, during the entire war, managed to drop an average of 20 percent of their bombs within 1000 feet of the aiming point.²¹ While this data does not permit an exact comparison between the accuracy of area versus precision bombing attacks, it does clearly illustrate the far greater accuracy of the American method of bombing. Given the greater accuracy of U.S.A.A.F. bombing, in conjunction with the fact that the bombing was generally aimed at industrial or transportation targets, it is understandable that markedly fewer civilian casualties were associated with the American raids.

²⁰U.S.S.B.S. Description of R.A.F. Bombing (Washington, D.C.: U.S. Government Printing Office, 1947), pp. 8-9.

²¹U.S.S.B.S. Summary Report (European War) (Washington, D.C.: U.S. Government Printing Office, 1945), p. 5.

CHAPTER II

R.A.F. VERSUS U.S.A.A.F. BOMBING POLICIES

The previous chapter established that the R.A.F. and the U.S.A.A.F. had preferences for widely divergent target systems. The clear preference of the R.A.F. was to attack built-up areas in German cities, while the preference of the American Air Force was to attack German war industry. It is important to an understanding of the "historical system" which is being considered in this study, to attempt in this chapter to explain the suppositions underlying these two bombing policies as well as to outline the process whereby each was derived.

SUPPOSITIONS UNDERLYING R.A.F. BOMBING POLICY

As early as January 1941 the British Chiefs of Staff had endorsed a plan put forth by the Joint Planners for the systematic bombing of the German urban population. In this report, it was suggested that: "concentrated attacks on the main centres of population in Germany, making the maximum use of damage by fire, continued with harassing action in the interval between the main attacks, might comparatively quickly produce internal disruption in Germany."¹ Such thinking was based on the widespread belief that if civilians were subjected to bombardment on a massive scale, the enemy's popular morale would be undermined, "causing deep civilian reactions, possibly even nervous derangements on a disastrous scale."²

¹Sir Charles Webster and Noble Frankland. The History of the Second World War: The Strategic Air Offensive Against Germany, 1939-1945, I, p. 297.

²Alexander P. De Seversky, Victory Through Air Power (New York, N.Y.: Simon and Schuster, 1942), p. 145.

By destroying the administrative centres, the housing of the working population, and public utilities, it was assumed that the resultant chaos would serve to accomplish the long-range goal of dislocating German war industry and communication.³

To those who favored area attacks on the built-up area of German cities, the civilian population was regarded as a "military target." Civilian morale was regarded as an essential component of the German war machine. As such, in the minds of British military strategists, it constituted a military and not an indiscriminate target system.⁴

When it came down to specifying exactly how the disintegration of the German war effort was to follow from the bombing of the civilian population, most strategists were understandably unclear in their hypothesis. Basically, however, most of the enthusiasts for population bombing believed that something similar to the following process of breakdown would occur:

The general devastation so brought about would, it was sometimes suggested, produce the necessary effect on the enemy in two main ways. First, by depriving the workers of their homes and amenities . . . it would prevent them from carrying on their work and so make production difficult or even impossible. Secondly, it was thought that because of the threat of death and mutilation and the deprivation of the amenities of life the will of the people to continue the war would be so weakened that they might force their government to sue for peace.

There would also be other results. Some factories, even though not specifically aimed at, would inevitably be destroyed in the towns attacked, and the general level of production thus substantially reduced.⁵

³U.S.S.B.S. Description of R.A.F. Bombing, p. 1.

⁴Lord Tedder, Air Power in War (London, England: Hodder and Stoughton, 1948), pp. 97-98.

⁵Sir Charles Webster and Noble Frankland, The History of the Second World War: The Strategic Air Offensive Against Germany, 1939-1945, I, p. 26.

Toward the end of effecting this disintegration, 50 German cities were attacked. The faith that some British strategists had in the ultimate success of this bombing policy is indicated in this statement made by Sir Arthur Harris early in the war (Harris was appointed Commander-in-Chief of Bomber Command in February of 1942). "If I could send a thousand bombers over Germany every night, Germany would not be in the war by autumn." ⁶

DERIVATION OF THE R.A.F. BOMBING POLICY

The Royal Air Force had not always practiced the policy of civilian bombing. Indeed, the R.A.F. started the war with a belief in a bombing strategy not unlike that with which the United States Air Force entered the war. In the early stages of the air war against Germany, the R.A.F. practiced daylight-precision bombing operations against German oil, aluminum, and aircraft industries. After suffering serious casualties in these daylight attacks, the attacks against these industries were shifted from daylight to the less hazardous night operations. Bomber Command seemed to have been more than satisfied with the results that these attacks were achieving. During this period Sir Arthur Harris in a letter to Sir Richard Peirse (Peirse was then Commander-in-Chief of Bomber Command) had commented on the "accuracy with which our aircraft hit military objectives as opposed to merely browning the towns." ⁷ As late as October, 1940,

⁶Francis Drake, Verticle Warfare, p. 129.

⁷David Irving. The Destruction of Dresden (New York, N.Y.: Holt, Rinehart and Winston, 1963), p. 27. In February of 1942 Sir Richard Peirse was appointed Commander-in-Chief of Allied Air Forces in the Far East. Sir Arthur Harris replaced him as Commander-in-Chief of Bomber Command.

Peirse in a letter to the Prime Minister still supported the idea of precision bombing.⁸ However, this policy was confronting increasing criticism and was soon to be replaced with the policy of area attacks on German cities.

Evidence that had been gradually accumulating at Bomber Command led to the conclusion that night-precision bombing operations were extremely inaccurate. In reality, these night operations, even though the pilots were confirming hits upon the assigned targets, were generally failing to come anywhere near their objectives. When the Butt Report was submitted in August of 1941, these deficiencies could no longer be ignored by Bomber Command. This study, initiated to interpret photographic data and present its findings regarding the accuracy of R.A.F. bombing, concluded that of the aircraft claiming to have attacked their targets, only one-third had in fact bombed within 5 miles of their objective. If the target was well-defended and located deep in German territory, only one-tenth of the aircraft claiming to have bombed their objectives had, in fact, come within 5 miles of doing so.⁹ To say the least, the undisputed findings of the Butt Report proved most earth shattering to Bomber Command.¹⁰

⁸ Ibid., p. 27.

⁹ Sir Charles Webster and Noble Frankland, The History of the Second World War: The Strategic Air Offensive Against Germany, 1939-1945, I, p. 178. The whole report can be found in Vol. IV, p. 205.

¹⁰ Previous estimates of bombing accuracy were based primarily on the reports of bomber crews and not on photographic data. General Eaker, for example, (Commander of the United States Air Force in Britain) had estimated prior to the Butt Report that 40 per cent of all bomb tonnage would fall within 500 yards of the aiming point.

Anthony Verrier. The Bomber Offensive (London, England: B.T. Batford Ltd., 1968), pp. 124-125.

It had long been the position of Sir Charles Portal, regarding the choice of target systems, that "the most suitable object from the economic point of view is not worth pursuing if it is not tactically attainable."¹¹ Progressively, the strategists at Bomber Command realized that precision attacks against German industrial targets were not practical. Early in 1941 oil targets had been abandoned as a primary target and in May, the R.A.F. offensive was directed against marshalling yards in the Ruhr. This target system had been selected because it was felt that marshalling yards presented a sufficiently larger target for attack, therefore making operations against them feasible. When by early 1942, this target system also proved "tactically unattainable", Bomber Command gave up the idea of precision bombing altogether and resorted to the only target system left that seemed feasible to attack: the German city and civilian morale.¹² Sir Arthur Harris described the choice of attacking civilian morale as a "council of despair, based on the previous failure of night bombing, and the breakdown of the theory of precision attacks on key factories."¹³

One U.S.S.B.S. report summarized the process whereby the British policy of city centre attacks was derived in the following terms:

¹¹Sir Charles Webster and Noble Frankland, The History of the Second World War: The Strategic Air Offensive Against Germany, 1939-1945, I, p. 168.

¹²U.S.S.B.S. The Effects of Strategic Bombing on the German War Economy (Washington, D.C.: U.S. Government Printing Office, 1945), pp. 1-2.

¹³Sir Arthur Harris. Bomber Offensive (London, England: Collins Press, 1947), p. 76.

The policy of using air power against German cities did not represent a decision between attractive alternatives; it was to a large extent imposed on the R.A.F. by the limitations of its air weapon. Prior to the development of long-range fighters and the discovery and improvement of non-visual bombing aids and techniques, the R.A.F. could not undertake daylight bombing without prohibitive losses, nor could it achieve significant accuracy in night bombing to attack other than very large targets. Even with the earlier forms of radar, an attack on a target smaller than a city area of at least 100,000 population was not economical. ¹⁴

Given these problems, "In early 1942 Bomber Command of the R.A.F. resorted to systematic bombing of German cities which presented a large area for attack, so that a widely spread out bomb pattern could prove effective." ¹⁵ Simply stated, the main reason for the R.A.F. adopting the German city centre as their top priority target system, was that the R.A.F. was incapable of effectively hitting any other type of target. ¹⁶

SUPPOSITIONS UNDERLYING U.S.A.A.F. BOMBING POLICY

The American bombing policy was founded on the assumption that "it was better to cause a high degree of destruction in a few really essential industries or services than to cause a small

¹⁴U.S.S.B.S. Area Studies Division Report, p. 3.

¹⁵U.S.S.B.S. Over-all Report (European War) (Washington, D.C.: U.S. Government Printing Office, 1945), p. 71.

¹⁶For a discussion of how the use of air power and strategic thinking during the interwar period influenced British bombing policy see Andrew Verrier's book The Bomber Offensive, pp. 13-17. His account of this problem is as good as any I have discovered. It does, however, suffer from failing to explain the nature of the interaction between important factors. As these problems are not particularly germane to the interests of this thesis, I thought it best to avoid consideration of this long range derivation causality.

degree of destruction in many industries." ¹⁷ The U.S.A.A.F. consequently focused its bombing effort on what they considered to be the key industrial components supporting the German war effort. As was mentioned in the first chapter, this meant that the U.S.A.A.F. sought to destroy the following basic target groups: submarine production, the aircraft industry, the ball-bearing industry, and oil production. In contrast to the doctrine of general destruction executed by the R.A.F. on German cities, the U.S.A.A.F. sought to cripple the war making ability of Germany by destroying the essential industries upon which her military operations precariously depended.

In the final analysis, both components of the Allied Air Forces hoped to effect a paralysis of German war making potential. The difference between the two strategies of bombing was a disagreement over the means that would achieve this end. The R.A.F. hoped to accomplish Germany's defeat indirectly--through the undermining of civilian morale with its consequent impact on German production, while the U.S.A.A.F. hoped to accomplish Germany's defeat directly--through the destruction of one or more important components of the German war industry.

¹⁷ Sir Charles Webster and Noble Frankland. The History of the Second World War: The Strategic Air Offensive Against Germany, 1939-1945, II, p. 15.

DERIVATION OF THE U.S.A.A.F. BOMBING POLICY

The precision bombardment theory of air attack was being expounded in the United States as early as 1933. At the Air Corps Tactical School, Major General Donald Wilson (then a Captain), lectured to the effect that transportation and electric generator manufacturing industries should be classified as key components of the nations economy and therefore should be top-priority targets in the case of war. He reasoned that as a result of the destruction of these critical components of an enemy's economy, financial chaos would ensue, thus undermining the enemy's war effort. By the end of the decade, this basic precision bombing strategy had become thoroughly accredited at the Air Corps Tactical School, the major instructional facility for the Air Corps during that period.¹⁸

Quite understandably, the emphasis on precision bombing forced Air Corps strategists to adopt daylight as opposed to night bombing operations. "Small targets which were difficult to see from the air and which required precision bombing would best be destroyed in daylight attacks."¹⁹ By 1932, the Tactical School had endorsed this daylight-precision bombing technique.²⁰ It was precisely this policy of bombing, unchanged and untested by practical experience, that the United States brought with them into the Second World War.

¹⁸Robert T. Finney. History of the Air Corps Tactical School, 1920-1940. (Maxwell Air Force Base, Alabama: USAF Historical Study No. 100, 1955), pp. 31-32.

¹⁹Ibid., p. 32.

²⁰Ibid., pp. 37-38.

Upon entering the war, the American bombing policy was not unlike that which Britain had when she entered the war. As was discussed earlier in this chapter, the R.A.F. had similarly begun the war utilizing daylight-precision bombing techniques, as well as by attacking industrial targets in Germany. Where the histories of the two air forces differed, however, was in the fact that the R.A.F. abandoned the daylight bombing technique in favor of the less hazardous night operations. It will be remembered that this change to night bombing forced a change to the less accurate "area bombing" method of bombardment, since only the largest of targets--cities, could be spotted and attacked at night.

Unlike the British, the Americans clung to their theory of daylight-precision bombing. This dogmatic adherence was, of course, not without cost. Like the English, and even to a much greater degree, the Americans suffered serious losses inflicted on them by the Luftwaffe. One example of such casualties comes immediately to mind. In accordance with their daylight-precision bombing strategy, the American Air Force had attacked the anti-friction bearing industry located in Schweinfurt. Of the 228 bombers sent to attack Schweinfurt on August 14, 1944, 62 or 27 percent of the attacking force were lost. However, such losses, instead of forcing the U.S.A.A.F. to deviate from their bombing policy as it had caused the R.A.F. to do, acted as an incentive to develop the long-range fighter to provide protective cover for Allied raids. This development established an unchallenged air superiority for the Americans, thus making possible the continuance of the daylight-precision bombing practices of the American Air Force.

The exact reason for the Americans stubborn adherence to the doctrine of daylight-precision bombing is unclear. However, it is clear from the comments of General Eisenhower in his memoirs, Crusade in Europe, that Britain's Prime Minister tried to shift American bombing operations into conformity with those of the Royal Air Force. General Eisenhower related that "the Prime Minister urged us to give up the whole idea of daylight bombing and start training our crews for night work . . . their experience had driven them to bomb only at night; otherwise they suffered unsupportable losses." ²¹ According to Eisenhower, the reason for his resistance to any change in American bombing practices revolved around his concern for the success of the invasion of France. He felt that the invasion would demand close support from an air force adept at daylight-precision bombing. Without it he feared the invasion would be impossible or, at best, "exceedingly risky." ²²

CONCLUSION

The decision regarding the choice of target systems were governed by operational factors and expediency. As Appendix I demonstrates, the American Twentieth Air Force, when they thought area bombing of Japanese cities was conducive to their purposes, made even greater use of this strategy than Britain had done against Germany. In this regard, the authors of the official history of the

²¹Dwight D. Eisenhower. Crusade in Europe (Garden City, New York: Double Day and Company, 1948), p. 63.

²²Ibid., p. 65.

air offensive observed that : "the Germans, the British and the Americans too, adopted the policy of area attack when they considered that precision bombing was either impossible or unprofitable." ²³

²³ Sir Charles Webster and Noble Frankland, The History of the Second World War: The Strategic Air Offensive Against Germany, 1939-1945, I, p. 22.

PART II

THE EFFECTS OF AREA BOMBING ON THE GERMAN CIVILIAN

CHAPTER III

SURVEY OF THE MATERIAL DAMAGE INFLICTED UPON GERMAN CITIES

As a result of the Allied bombing offensive against the German civilian population, 61 German cities with populations each of which was over 100,000 were bombed. Together these cities contained approximately 25,000,000 inhabitants or 32 percent of Germany's wartime population. Consequent to these raids, between 300,000¹ to 635,000² civilians were killed. In addition, approximately 82,000 acres or 128 square miles of "built-up" area in these cities were destroyed.³ It remains for this chapter to consider the extent and nature of this devastation.

EXTENT OF DAMAGE TO BUILT-UP AREAS

Sir Arthur Harris estimated that nearly all the cities attacked by the Allied Air Forces had suffered between 40 to 60 percent of their built-up areas destroyed. In aggregate, the devastation to built-up areas is reported to have amounted to 82,000 acres. What this meant in terms of acres of destruction in specific German cities is illustrated by the following data. Cities such as Berlin and Cologne were reported to have had suffered between 60 to 80 percent of their built-up areas

¹U.S.S.B.S. Summary Report (European War), p. 15.

²David Irving, The Destruction of Dresden, p. 41.

³Sir Charles Webster and Noble Frankland, The History of the Second World War: The Strategic Air Offensive Against Germany, 1939-1945, I, pp. 49-50.

destroyed: ⁴ Berlin lost 6,427 acres, Cologne lost 1,994 acres. Other cities suffered the following devastation: Hamburg suffered 6,200 acres destruction, Dusseldorf 2,003 acres, and the cities of Dresden, Bremen, Duisburg, Essen, Frankfurt-on-Main, Hanover, Munich, Nuremberg, Mannheim-Ludwigshafen, and Stuttgart each suffered between 1000 to 2,000 acres devastated. ⁵

By way of comparing the extent of devastation wrought by the Allied raids on German cities to the extent of damage inflicted by the Luftwaffe on English cities, it is appropriate to list the acreage of built-up areas destroyed in England. London is reported to have lost approximately 600 acres as a consequence of Luftwaffe raids. Plymouth is reported to have suffered the destruction of 400 acres, while Coventry lost nearly 100 acres. ⁶ The differences in terms of city acreage devastated between England and Germany is truly remarkable.

EXTENT OF DAMAGE TO RESIDENTIAL HOUSING

The German Bureau of Statistics estimated that 490,000 residential buildings had been devastated and rendered permanently uninhabitable. This lost housing amounted to the permanent destruction by city raids of approximately 3 percent of all residential buildings in Germany. If the residential buildings that were considered as being temporarily uninhabitable are included in this estimate (338,750 residential

⁴U.S.S.B.S. Over-all Report (European War), p. 93. U.S.S.B.S. Cologne Field Report (Washington, D.C.: U.S. Government Printing Office, 1947), p. 2.

⁵Sir Arthur Harris, Bomber Offensive, p. 261.

⁶Ibid., p. 261.

buildings were listed in this category), the percentage of housing made uninhabitable by the city raids increases to 5 percent.⁷ As a consequence of this destruction to residential buildings, 7,500,000 civilians were made homeless.⁸

In addition to destroying completely or temporarily making uninhabitable nearly 5 percent of German housing, Allied city raids damaged an additional 579,000 residential buildings. This additional damage, however, was not so serious that it necessitated evacuation of the premises. Inclusive of this additional but less extensive damage, Allied raids on German cities damaged or destroyed 1,407,750 residential buildings. Of the 25,000,000 inhabitants of these cities, more than 14,076,000 (56 percent) suffered either moderate or severe property damage consequent to Allied bombing. Clearly, the damage inflicted on German civilians by Allied bombing was widespread.⁹

CONCLUSION

Sir Liddell Hart, the famous British military historian, characterized the bombing strategy that produced the destruction described in this chapter as "indiscriminate." He termed the progressively greater emphasis that the British bombing strategy placed on undermining the morale of the German civilian as a policy

⁷U.S.S.B.S. The Effects of Strategic Bombing on German Morale, (Washington, D.C.: U.S. Government Printing Office, 1946), I, p. 9.

⁸U.S.S.B.S. Summary Report (European War), p. 1.

⁹U.S.S.B.S. The Effects of Strategic Bombing on German Morale, I, p. 6.

of "terrorisation."¹⁰ He described the bombing of Dresden by the combined British and American Air Forces in February of 1945, as "the deliberate revival of 'terrorisation' as a prime aim" of Allied strategy.¹¹

George H. Quester, an American military historian, is in agreement with Liddell Hart's characterization of Allied city centre attacks. In his book dealing with aerial strategic history Quester refers frankly to the Allied attacks on German civilians during World War II as "terror raids."¹² Such a characterization of Allied city centre attacks seems to be the obvious conclusion of any honest assessment of the historical reality of this problem.

¹⁰Sir Basil Henry Liddell Hart. Liddell Hart's History of the Second World War. (London, England: Cassell and Company Ltd., 1970), pp. 594-595.

¹¹Ibid., pp. 609-610.

¹²George H. Quester. Deterrence Before Hiroshima: The Airpower Background of Modern Strategy (New York, N.Y.: John Wiley and Sons, Inc., 1966), p. 149.

CHAPTER IV

THE PROBLEM OF ESTIMATING CIVILIAN CASUALTIES

Unfortunately, the problem of estimating the number of civilian casualties is not a simple one. Documents that were of importance to making an estimate of this sort were frequently destroyed in air attacks or else were lost in the general chaos that followed Germany's defeat.¹ Because of the lack of credible statistical data on which to base an estimate of civilian casualties, the estimates that have been attempted have resulted in a wide variance of ranges. The Summary Report of the United States Strategic Bombing Survey derived a minimum estimate of 305,000 civilians killed² as a result of the Allied air offensive, while David Irving in The Destruction of Dresden settled on the figure of 625,000 civilians killed.³ Despite the confusion and arbitrariness that clouds this problem, one source encountered did provide what seemed to be the most reasonable speculation on this problem. The U.S.S.B.S. report entitled The Effects of Strategic Bombing on Health and Medical Care in Germany dealt specifically with this problem of casualty estimates. The methods and estimates considered in this chapter are from this source.

¹U.S.S.B.S. The Effects of Bombings on Health and Medical Care in Germany (Washington, D.C.: U.S. Government Printing Office, 1945), p. 6.

²U.S.S.B.S. Summary Report (European War), p. 15.

³David Irving, The Destruction of Dresden, p. 41.

CASUALTY ESTIMATES FOR THE 1940 to 1944 PERIOD

Casualty estimates for the 1940 to 1944 period were based essentially on those estimates that had already been made by local police and on information collected from the German Bureau of Statistics. To test the validity of the estimates made from this cumulative data, the Survey personnel compared the peak casualty periods with the records of the U.S. Air Force regarding the number of bombing sorties flown against German cities. This was done on the assumption that oscillations in casualties generally occurred simultaneous to oscillations in the number of missions flown over a certain city. Where discrepancies existed in this relationship, as in the case of Hamburg where the Survey calculated that German statistics underestimated casualties by 20,000, the figures were artificially balanced.

Taking these factors into consideration, the Survey arrived at the following estimates of casualties for the 1940 to 1944 period: 1940--349; 1941--2,785; 1942--4,327; 1943--103,271.⁴ It is likely that these estimates are fairly accurate. During this period, the frequency and smaller size of city attacks made more accurate casualty estimates possible.

CASUALTY ESTIMATES FOR THE 1944 to 1945 PERIOD

The attempt of the Survey report to provide accurate estimates of civilian casualties between 1944 to 1945 proved disappointing. In this

⁴U.S.S.B.S. The Effects of Bombing on Health and Medical Care in Germany, p. 11.

latter period there proved to be a wide discrepancy between the data derived from the German Bureau of Statistics and police records and the data obtained from the U.S. Air Force records. For example, during the March, 1944, raid on Nuremburg, 60 casualties were reported to have resulted from an expenditure of 2,704 tons of bombs. Yet, a raid on the same city in November was reported to have caused 98 casualties with an expenditure of a mere 190 tons.⁵ As a result of this confusion of statistics, the Survey was unable to use the oscillation method of crosschecking estimates that it had utilized in the earlier period.

The Survey investigators decided to estimate casualties for the 1944-1945 period based on what they calculated was the correlation between bomb tonnage dropped and casualties produced. The investigators explained away the unfortunate position in which they found themselves by remarking that . . . "Any other type of estimation seemed to be even more inaccurate with less basis for justification of its use, than did the method determined upon."⁶ By using this bomb tonnage correlation method the Survey arrived on the . . . "highly speculative results of 201,000 deaths from air attacks in 1944 and 110,000 deaths from January 1, 1945, to the cessation of hostilities."⁷ In total then, the Survey estimated that 422,000 civilians had been killed by Allied bombings.

⁵ Ibid., p. 11.

⁶ Ibid., p. 11.

⁷ Ibid., p. 12.

ADDITIONAL FACTORS AFFECTING CASUALTY ESTIMATES

An over-all estimate of the civilian casualties produced by Allied bombings must, however, go beyond this 422,000 figure. It is important to realize that this total was an estimate only of the casualties produced among the "resident" civilian population. The local police and the German Bureau of Statistics kept records concerning only the resident civilians. If a resident was not registered with the authorities, his death would not have been noticed statistically. In this regard, if an estimate of the casualties that were produced in the general population is desired, to the subtotal of 422,000 would have to be added those foreigners, Jews, slave laborers, displaced persons, members of the Wehrmacht, security police, and prisoners of war, who were also killed by air attacks.⁸

The estimate of 422,000 civilians killed also fails to take into account those civilians listed as "missing" as a result of air attacks. Those bodies that were buried in the rubble during an attack or were otherwise not discovered by authorities (some bodies were vaporized), were not considered in this estimate. In considering this deficiency, the Survey report concluded that during the last ten months of the air offensive, at minimum, those missing "easily totalled 25 percent or more of the recovered and recorded deaths."⁹ The investigators emphasized that this estimate of missing persons was "very conservative."

⁸ Ibid., p. 12.

⁹ Ibid., p. 12.

In concluding its consideration of the problem, the Survey report decided that a conservative estimate of the total number of civilians killed by Allied bombing revolved around the figure 499,750.

In addition to the fatalities produced by these bombings, a large number of injuries also resulted. Estimating the exact number of people injured by Allied bombing seemed pointless, since the classification of civilians in this category was so uncertain during the war. As far as this section is concerned, fatalities provide the more valid index for adjudging the impact of the Allied raids on the German civilian.

PROPORTION OF MEN, WOMEN AND CHILDREN KILLED

Research in this area shows clearly that the majority of the casualties suffered in city raids were inflicted upon women and children.¹⁰ The main reason for this imbalance in casualties, as was suggested by one source, was that because of mobilization, fewer men than women were subjected to the city bombing.¹¹

Data regarding the exact proportion of women and children killed as compared to men was not encountered while doing research for this thesis. However, one Survey report, A Detailed Study of Area Bombing on Darmstadt, did consider this problem in relation to two area raids on Darmstadt. The

¹⁰Fred Ikle. The Social Impact of Bomb Destruction (Norman, Oklahoma: University of Oklahoma Press, 1958), p. 205.

U.S.S.B.S. The Effects of Bombing on Health and Medical Care in Germany, p. 5.

¹¹Fred Ikle, The Social Impact of Bomb Destruction, p. 205.

suggested proportions are far from conclusive but do give an indication of the relationship that may exist between these three groups. In the raid of September 23, 1943, on Darmstadt, the R.A.F. had aimed at the marshalling yards and the following proportion of civilian deaths resulted: men--28, women--80, and children--35.¹² In this attack, 80 percent of the civilian fatalities were women and children. (Women alone accounted for 56 percent of the deaths, children accounted for 24 percent and men for 20 percent.) In the area raid on the centre of Darmstadt on September 11, 1944, the following proportion of civilian deaths resulted: men--1,766, women--2,742, and children--936.¹³ In this attack, 73 percent of the civilian fatalities were women and children. (Women alone accounted for 43 percent of the deaths, children accounted for 32 percent and men for 27 percent.) In both these cases, the deaths among women and children amounted to between 73 to 80 percent of the total number of civilians killed in city raids.¹⁴

¹²U.S.S.B.S. A Detailed Study of the Area Bombing of Darmstadt (Washington, D.C.: U.S. Government Printing Office, 1947), p. 9a.

¹³Ibid., p. 9a.

¹⁴Ibid., p. 9a.

CONCLUSION

The magnitude of civilian fatalities produced by Allied city centre attacks as compared to the total number of American combat casualties suffered in World War II provides a most enlightening index. Such a comparison helps to place into perspective the nature of the destruction of life effected by the Allied aerial military strategy in World War II. General Eisenhower estimated that approximately 322,188 American soldiers lost their lives in the Second World War.¹⁵ In this chapter it was estimated that a conservative estimate for the number of civilian fatalities produced by the Allied bombing of Germany was 500,000. Therefore, the number of civilian fatalities inflicted upon the German civilian population in World War II exceeded by one and one-half times the number of American combat deaths suffered in all theatres of the world war. (This relation is even more pronounced in the case of the Allied air offensive against Japan---SEE APPENDIX I for comparative civilian casualty estimates.)

Indeed, the number of civilian casualties in World War II was generally commensurate with the total number of casualties suffered by the combined military forces of the belligerent powers.¹⁶ All the belligerent powers shared in this indiscriminate destruction of civilian populations. The 500,000 German civilians and the 300,000 to 900,000 Japanese civilians killed by the Allied air offensive (SEE APPENDIX I) are evidence of the fact that the Allies contributed

¹⁵ Dwight D. Eisenhower, Crusade in Europe, p. 1.

¹⁶ Richard Lambert (ed.). 'How Wars End' The Annals of the American Academy of Political and Social Sciences. Vol. 392 (Philadelphia, Penn.: The American Academy of Political and Social Sciences), p. 118.

in no small part to this loss of life. The fact that at least the majority of the German civilian fatalities induced by Allied bombing (and perhaps as much as 70 to 80 percent of them) were among women and children serves to make this reality all the more tragic.

CHAPTER V

THE NATURE OF CIVILIAN CASUALTIES

The Allied air offensive against the German urban population produced casualties, the peculiarities of which deserve some consideration in this chapter. During the early years of the war, the manner in which Allied bombings killed civilians had German physicians baffled. Authorities found some corpses nearly consumed by fire, leaving little question as to the cause of death. Other air-raid victims, however, were discovered to be very much natural in appearance and seemed to have suffered no physical discomfort. The circumstances that produced these mysteries were an immediate source of urgent interest to the German government. In 1943, the Reich Ministry of the Interior proclaimed that in all instances where the cause of death was not immediately obvious in an air-raid victim, the corpse should be subjected to an autopsy. As a result of this policy between 20,000 to 30,000 autopsies were performed in the course of the war on air-raid victims. In addition to this investigation, a group of physicians from the Luftwaffe ~~was~~ organized to collect data regarding the cause of death in the bombings.¹ A consequence of these inquiries was that volumes of material have been accumulated on the subject of the nature of civilian air-raid casualties. In this chapter, only the two main causes of air-raid fatalities will be considered. In dealing with these causes, this chapter will also attempt to describe the reality that the German civilian was subjected to by Allied bombing.

¹U.S.S.B.S. The Effects of Bombings on Health and Medical Care in Germany, p. 14.

DEATH CAUSED BY HEAT AND FIRE

The cause of death or the nature of injury inflicted on a civilian was a result of the particular type of bomb dropped in a given raid. Altering the mixture of incendiary, high explosive, and anti-personnel bombs in the bomb tonnage would alter the nature of the casualties produced on the subjected population. When an abnormally large percentage of the casualties was produced as a direct or indirect result of conflagration, an incendiary raid was more than likely the cause. Where the target area was flammable, as was the case in residential areas, these fire-bombs proved themselves 4.8 times as destructive as high explosive bombs.² As far as over-all destruction was concerned, incendiary attacks demonstrated themselves repeatedly to be one of the more destructive weapons the Allies utilized against Germany. In the case of Hamburg, between 75 to 80 percent of all destruction to the city (at the end of the war there were 30 square miles of partially burned out area and 12.5 square miles that were completely devastated) was caused by incendiary induced fires. Similarly, it was estimated by German officials that incendiary induced fires accounted for approximately 75 percent of the destruction to Berlin.³

The degree of destruction produced during an incendiary raid was dependent on whether or not a fire-storm was produced as a result of the attack. Where catastrophic devastation was reported in city attacks during the war, most notably in the cases of Hamburg and Dresden, fire-storms were singularly to blame for the destruction. These infernos

²U.S.S.B.S. Over-all Report (European War), p. 93.

³Ibid., p. 93. The 12.5 square miles destruction figure differs from the 6,200 acre figure given on page 22. Each estimate comes from a different source. This type of disparity characterizes all areas of this historical problem.

resulted infrequently and only when weather conditions favored their formation. In the case of the Hamburg fire-storm, the temperature had been in the eighties several days before the raids in July and August of 1943. The humidity was reported to have been very low. These conditions presented an optimum environment for combustion. Under these circumstances, it was possible for the incendiaries to produce an infinite number of secondary fires that raged uncontrollably. The ultimate result was that the whole city centre was engulfed in a conflagration simultaneously.

While the fire-storm was an infrequent phenomenon, a number of German cities did suffer its presence. Fire-storms appeared in Hamburg, Dresden, Darmstadt, Kassel,⁴ and Brunswick.⁵

The description of the Hamburg fire-storm given in one Survey report provides a clear picture of what the citizens of these cities experienced:

. . .these storms occurred when incendiaries started many fires within a relatively short time over an extensively built-up area. It was estimated that, in Hamburg, within 20 minutes, two out of three buildings were afire within a 4.5 square mile area as a result of incendiary bomb strikes As many fires broke through the roofs of buildings there rose a column of heated air more than 2 1/2 miles in diameter, as measured by aircraft flying over Hamburg. This column was turbulent and was fed at its base by intrushing cooler ground-surface air. One and one-half miles from the fire this draft increased the wind velocity from 11 to 33 miles per hour. In a short time the temperature reached the ignition point for all combustibles and the entire area was ablaze. In such fires complete burn-out occurred; that is, no trace of combustible materials remained and only after 2 days were the areas cool enough to approach.⁶

⁴ Ibid., p. 68.

⁵ David Irving, The Destruction of Dresden, pp. 65 and 209.

⁶ U.S.S.B.S. Over-all Report (European War), p. 68.

Under these circumstances, it is understandable that heat and fire played a dominant part in influencing the nature of civilian casualties in Germany, specifically in the cities where fire-storms occurred. Witnesses of the Hamburg holocaust reported that the temperature in the city's blocks reached 800°C. (1,472°F.).⁷ Many civilians in bomb shelters were forced by the increasingly unbearable heat to abandon their shelters and to seek safety elsewhere. As these people ran from their bomb shelters, they were seen to slowly collapse on the ground, totally exhausted. Many of these air-raid victims were later found naked in the streets, their clothes presumably vaporized by the intense heat.⁸ Professor Graeff, a German pathologist interviewed by Survey personnel after the war, was in Hamburg at the time of these raids, and described the scene that confronted him:

Many bodies were lying in the streets half clothed or nude. The only covering they always had on were their shoes The victim's hair was often burned, but frequently preserved. A few hours after the start of the raid the corpses had a peculiar aspect; they seemed to be blown up, lying on their stomachs. The buttocks were enlarged and the male sex organs were swollen to the size of a child's head This picture lasted only a few hours; after this time the bodies shrunk to small objects with hard brownish black skin and charring of different parts and frequently to ashes and complete disappearance.⁹

Following these fire-storms, it often took weeks to allow the temperatures to cool to the extent that search and rescue teams could enter

⁷ U.S.S.B.S. The Effects of Bombing on Health and Medical Care in Germany, p. 19.

⁸ Ibid., p. 19.

⁹ Ibid., p. 22.

the shelters in search of their occupants. In these circumstances, bodies were "found lying in a thick greasy black mass which was without doubt melted fat tissue."¹⁰ In contrast to the bodies found in the street, these shelter victims were not found lacking any articles of their clothing. However, one Survey report did note that these bodies also appeared shrunken and added that the pant legs and sleeves were often "burned off and with them the limbs were burned to the bones. Frequently such bodies burned to a crisp weeks after death--apparently after oxygen had become available. . . . Many basements contained only bits of ashes and in these cases the number of casualties could only be estimated."¹¹

Conditions in Dresden after the combined Allied fire-bombing of the city were even worse than those in Hamburg. A Swiss resident who was residing in Dresden at the time of the February 1945 raid gave the following account of what the scene looked like after the attack:

The sight was so appalling that without a second glance I decided not to pick my way among these corpses. For this reason I turned back and headed for the Grosser Gardens. But here it was even more appalling: walking through the grounds, I would see torn-off arms and legs, mutilated torsos, and heads which had been wrenched off their bodies and rolled away. In places the corpses were still lying so densely that I had to clear a path through them in order not to tread on arms and legs.¹²

¹⁰ Ibid., p. 23.

¹¹ Ibid., p. 23.

¹² David Irving, The Destruction of Dresden, pp. 192-193. This account appeared in a Swiss newspaper and prompted considerable international criticism of the Allied attack.

One hundred and thirty five thousand civilians died as a result of the combined Allied bombing of Dresden. ¹³ By way of comparison, German reports claim that the Hamburg conflagration resulted in the death of between 60,000 to 100,000 civilians. ¹⁴ Together, these two fire-storm catastrophies accounted for approximately 200,000 civilian deaths or 40 percent of the estimated fatalities produced by Allied bombing.

DEATH CAUSED BY CARBON MONOXIDE POISONING

Despite the fact that fire-storms presented the most dramatic and seemingly obvious cause of death for air-raid victims, in reality, the actual cause of death was generally found to be attributed only indirectly to heat and fire. In all cities that were investigated by the Survey, carbon monoxide poisoning was stated as the direct and primary cause of fatalities. ¹⁵ The Survey report entitled, The Effects of Bombing on Health and Medical Care in Germany concluded that carbon monoxide poisoning in some cases accounted for as much as 80 percent of all incendiary raid casualties. ¹⁶ In the case of both Hamburg and Kassel, 70 percent of all fatalities were attributable to carbon monoxide asphyxiation. ¹⁷

¹³Ibid., p. 14.

¹⁴U.S.S.B.S. Overall Report (European War), p. 92.

¹⁵U.S.S.B.S. The Effects of Bombing on Health and Medical Care in Germany, p. 24.

¹⁶Ibid., p. 28.

¹⁷David Irving, The Destruction of Dresden, p. 62.

Prior to and in the early years of the war, carbon monoxide poisoning was not considered by physicians as a possible cause of casualties. Yet, the fact that it was is easy to understand in retrospect. Nearly all the basic causes and effects of aerial bombardment served to produce gaseous products--the main one of course being carbon monoxide. Survey investigators noted in this regard that "fumes from ordinary fires are said to contain 3 percent of carbon monoxide gas, coal gas to contain 6 percent of carbon monoxide, gas from high explosive bombs to contain 60 to 70 percent carbon monoxide."¹⁸ One physician consulted reported it would only require an 0.5 percent concentration of carbon monoxide in the air to produce death after just one hour.¹⁹ While no estimates exist of exactly what the percentage content of carbon monoxide was retained in the air consequent to the Allied raids, surely the combination of carbon monoxide from the above sources raised the level above the 0.5 percent lethal concentration.

CONCLUSION

The exact proportion of fatalities caused by carbon monoxide poisoning as opposed to burning is not evident from the research. However, in this regard a speculation may be justly attempted. David Irving in The Destruction of Dresden did make note of the fact that 90 percent of the casualties suffered in the fire-storm at Darmstadt were caused either

¹⁸ U.S.S.B.S. The Effects of Bombing on Health and Medical Care in Germany, p. 24.

¹⁹ Ibid., p. 24.

by one or the other of these causes.²⁰ Since the Survey arrived at the figure of 70 percent of the deaths being caused by carbon monoxide poisoning, it seems feasible that 20 percent of incendiary casualties could be attributed to burns. In any case, carbon monoxide poisoning and burns were certainly the major factors in causing fatalities subsequent to Allied bombing raids.²¹

²⁰David Irving, The Destruction of Dresden, p. 62.

²¹This discussion accounts for approximately 90 percent of the factors that proved fatal to the victims of city centre bombing in Germany. Some of the factors that proved fatal to the remaining 10 percent fatality group were direct hits by bombs, the action of bomb fragments and other projectiles, shock, burial under rubble and drownings. (Subsequent to the attack on the Moehe Dam in 1943 by the R.A.F. approximately 1,194 people were drowned in the torrent of water released from the reservoir. This seems, however, to have been the only instance where drownings were a major factor in producing fatalities subsequent to an Allied raid.) For a full discussion of this problem see the U.S.S.B.S. report entitled The Effects of Bombing on Health and Medical Care in Germany, pp. 16-27.

PART III

THE EFFECT OF AREA BOMBING ON THE GERMAN WAR EFFORT

CHAPTER VI

PSYCHOLOGICAL AND PHYSIOLOGICAL DISORDERS PRODUCED BY AREA ATTACKS

Given the stimuli that confronted the German population during the Allied bombing raids, it is understandable that British military strategists expected these raids to cause widespread demoralization and panic among the German civilian population. It is difficult to imagine even hardened soldiers, let alone civilians, withstanding such experiences as were recorded in the previous chapter.

Research in this area clearly indicates that these bombings were far from being the ultimate weapon that many of the military and civilian leaders thought it to be prior to the Second World War.¹ At least in the case of Germany, these bombings failed to produce the much anticipated "mass hysteria" that the supporters of the bombing policy had hypothesized.

This, however, does not suggest that civilian bombings failed to produce any widespread aberrant behavior among the German urban population. There is, indeed, a good deal of evidence to indicate that the city bombings did have this latter effect while failing to achieve the predicted limits of hysteria and panic. It remains for this chapter to consider the nature and extent of these effects in terms of psychological and physiological disorders produced by bombing.

¹Irving L. Janis. Air War and Emotional Stress (New York, N.Y.: McGraw-Hill Book Company, Inc., 1951), p. 84.

PSYCHOLOGICAL DISORDERS

It is clear that various types of psychological disorders were produced by Allied bombings. However, even though psychological disorders were frequently evidenced in civilians, they were generally not of a chronic nature.² Post-war investigations into this area of consideration have consistently revealed that air attacks did not produce any more than a slight increase in 'persistent' psychological disorders among the German population.³

The truth of these statements, however, should not obscure the fact that the city bombings did produce discernible mental and physical disorders among the German people. For the reactions to bombing were acute and widespread. Characteristic responses to air-raids included: acute fear, apathy, confusion, depression, pessimism about the future, and emotional shock.⁴ These symptoms, however, usually subsided immediately after the end of an air-raid, while the more serious reactions, i.e., emotional shock, required a longer period of between two days to several weeks recovery.⁵ Even a large number of these more serious disorders recovered spontaneously or were cured by simple forms of psychiatric aid, i.e., with rest, sympathy, or suggestion.⁶

² Ibid., p. 72.

³ Ibid., p. 96.

⁴ Ibid., pp. 89, 96 and 98.

⁵ Ibid., p. 86.

⁶ Ibid., p. 87.

An indication of the widespread extent to which these "symptoms of acute anxiety" appeared in the general population is given by the Survey report entitled, The Effects of Strategic Bombing on German Morale. This report concluded that "38 percent of the people who had undergone bombings reported having experienced severe upset, intense fear, or nervous collapse; an additional 31 percent, temporary or less severe fright or upset. Only 22 percent claimed to have experienced little or no fear." ⁷ From this data it is evident the city bombings had widespread, but temporary, effects on the German people.

The seriousness or the intensity of these psychological disorders is indicated by analysis of certain behavioral indices during the war. The study Air War and Emotional Stress noted in this regard that during the war there were no increases in addiction to alcohol. Nor was there any increase in addiction to "sedations, pick-up drugs, or to other narcotics." ⁸ These findings would seem to indicate that the stress produced by bombings was not so serious as to force the population to seek refuge in the various forms of chemical escapism available in society.

There were, however, some behavioral indices that did increase and therefore indicate increased anxiety and nervousness in the population. Most notably, this supposition is indicated by the marked growth during the war of the habit of smoking in areas that were bombed heavily. ⁹

⁷U.S.S.B.S. The Effects of Strategic Bombing on German Morale, I, p. 99.

⁸Irving L. Janis, Air War and Emotional Stress, p. 78.

⁹U.S.S.B.S., The Effects of Bombing on Health and Medical Care in Germany, p. 104.

In addition, another source noted that there was also a tendency for these heavily bombed areas to have a higher rate of suicide. This latter increase, however, was shown to be statistically insignificant.¹⁰ This fact may indicate that the stress being discussed was not beyond the threshold of being controlled by rechanneling it into some nervous habit like smoking.

In summary, it might be stated that while the "mass hysteria myth" perpetuated by men like Mitchell, Trenchard and Douhet prior to World War II, did not materialize in Germany, the city bombings did nevertheless produce a widespread feeling of anxiety and nervousness among bombed Germans. Research indicates that nearly 70 percent of all bombed Germans experienced either serious or moderate psychological effects consequent to Allied raids. These reactions, however, were generally of a transient nature.

PSYCHOSOMATIC DISORDERS

Another indicator of the degree of psychological stress placed on the German urban population by the bombings is to note the variations in the rate of psychosomatic illness among civilians during the war. If the mental stress produced by bombings was severe, there should have been an observable increase in diseases associated with psychological disorders. Research indicates that a marked increase in various types of psychosomatic illnesses did, in fact, occur.¹¹

¹⁰Irving L. Janis, Air War and Emotional Stress, p. 76.

¹¹U.S.S.B.S. The Effects of Bombing on Health and Medical Care in Germany, p. 101.

The most serious increase in psychosomatic illnesses evidenced itself in an increased frequency of peptic ulcer in bombed communities. The segment of the population most acutely affected by this disorder were young adults. It was generally felt among physicians that the cause of this disorder was primarily due to nervous anxiety and fear induced by air attacks. One Survey report asserted, in this regard, that few cases of ulcer formation appeared in areas that were not bombed.¹² The report added that the ulcers of bombed civilians had the peculiarity of appearing to have been developed very rapidly. "In many cases the symptoms occurred suddenly during air-raids in persons who had not previously experienced gastrointestinal disorders."¹³ This seemingly spontaneous development no doubt suggests the extreme state of stress felt by individuals who developed the ulcer reaction to bombings.

Another psychosomatic illness that Allied bombings appeared to have increased was coronary disorders. A number of sources substantiated the fact that coronary thrombosis attacks "occurred with increased frequency during periods of bombings." This disorder was especially prevalent in men of middle age and older. The fact that this illness proved so frequently fatal to men in this age group caused this form of coronary attack to be called "the shelter death of the aged."¹⁴

¹² Ibid., p. 99.

¹³ Irving L. Janis, Air War and Emotional Stress, p. 90.

¹⁴ U.S.S.B.S. The Effects of Bombing on Health and Medical Care in Germany, p. 100.

In addition to these psychosomatic reactions, Allied bombings were found to also effect an increase in menstrual difficulties among women. Various minor complications with menstruation "occurred extremely frequently" among women subjected to bombing. This disorder was so widespread that it presented a major problem to German gynecologists throughout the war.¹⁵

The fact that Allied bombing did produce psychosomatic disorders among the subjected civilians is obvious. What may not be obvious is that though the frequency of these disorders increased markedly in bombed populations, the overall occurrence of serious psychosomatic disorders in the general population was rare. As in the case of psychological disorders, it is surprising that only this degree of physiological disorders was evidenced in the bombed population. Taking into consideration the events and traumatic experiences that confronted a large percentage of the bombed civilians, "the relative infrequency of the development of these disorders among the population is striking."¹⁶

¹⁵Irving L. Janis, Air War and Emotional Stress, p. 41.

¹⁶U.S.S.B.S. The Effects of Bombing on Health and Medical Care in Germany, p. 101.

CHAPTER VII

THE EFFECTS OF AREA BOMBING ON GERMAN MORALE

The fact that there was indeed a gross change in the disposition of German morale during the Second World War is easily substantiated. Investigations conducted by U.S.S.B.S. personnel revealed that at the beginning of the war only 17 percent of the German population "regarded the war as a mistake or as a hopeless cause" (this group had low morale). The group that was classified as having average morale constituted 51 percent of the population, while 32 percent of the population had high morale. As one might expect given the deteriorating state of German affairs at the end of the war, the condition of German morale was gradually depressed. At the end of the war, 78 percent of the German population regarded the war as a mistake or as a hopeless cause (this group had low morale). Sixteen percent of the people retained a disposition of average morale, and only 6 percent of the population was classified as having high morale.¹ What, however, is especially important regarding this decline, is to note that as early as January 1944 a total of 75 percent of the German people already regarded the war as lost.²

This chapter will first consider the various factors that served to effect this decline in German morale. It then will attempt to approximate the extent to which area bombing contributed to effecting this

¹U.S.S.B.S. The Effects of Strategic Bombing on German Morale, I, p. 13.

²Ibid., p. 1.

decline. Finally, it will consider the extent to which the decline in morale that was induced by area bombing served to handicap the German war effort.

FACTORS THAT AFFECTED GERMAN MORALE

Having read thus far, the reader must be assuming, if for no other reason other than sensory overload, that the decline in German morale discussed in the opening paragraph must have been caused primarily by Allied bombings. This, however, was not the case. In a cross-sectional study of 500 bombed civilians by psychologists and social scientists of the U. S.S.B.S. in Germany, findings revealed that this group regarded the overall "military situation" as the primary factor affecting their morale during the war. Only 36 percent of this study group adjudged Allied bombings the most important factor affecting their morale, while 44 percent considered the overall progress of Germany's military situation the dominant factor.³ While these two categories (military situation versus Allied bombings) are not clearly distinguishable from one another, because the Allied bombing constituted a part of the overall military situation, Survey investigators seemed confident after conducting exhaustive studies that the military situation--exclusive of bombing, was the most important factor affecting German morale.

Another study approached this same problem with different methodology and derived similar results. The Morale Survey personnel analyzed 33 monthly official reports made by the Germans regarding the condition of their own population's morale. In these series of reports, the

³Ibid., pp. 13-14.

Eastern Front of the war was specifically mentioned as the most depressing factor to morale. The air offensive against Germany was regarded as a factor of second importance.⁴ Additional factors that were considered of importance by the German reports included: "the U-boat war, military and political events concerning Germany's allies, agricultural problems, events on the Western front, rations, African campaigning, and heavy casualties."⁵

While the factors mentioned above were listed in the order of their overall significance, the relationship between these various factors should not be considered as being a static one. Throughout the war these relationships oscillated considerably. For example, while the Eastern Front was for most of the war the main factor affecting morale, it did not always occupy this dominant position. As the air offensive against Germany gained in intensity, Allied bombing "gradually displaced the Eastern Front as the most important factor affecting morale."⁶ Subsequent to the Normandy Invasion in June 1944, the air offensive was, in turn, displaced from this position and the Western Front became the most important factor affecting morale.⁷

Both these studies reveal that the factors affecting German morale during World War II were not in static relationship to each other. Rather, the relationship of these factors to the affected morale was fluid. In

⁴Ibid., p. 43.

⁵Ibid., p. 43.

⁶Ibid., p. 43.

⁷Ibid., p. 43.

general, however, the overall military situation seems to have been of more importance than any other factor in affecting German morale.

THE EFFECT OF AREA BOMBING ON GERMAN MORALE

To attribute to the general military situation the position of most importance in affecting morale, is not to minimize the importance of the air offensive in this regard. Both the studies considered thus far agreed that the significance of Allied bombings was second only to that of the overall military situation. The German reports on the condition of morale even indicate that between late 1943 and early 1944, German authorities considered the air offensive as the most important affector of morale. It is obvious that, while the air offensive may not have been in general the most important factor affecting the condition of German morale, it certainly was a significant one. For this reason it is worthwhile to consider to what extent the Allied bombings of Germany succeeded in undermining German morale.

In considering the effect of Allied bombing on German morale, it is important to first distinguish between 'attitudinal' as opposed to 'behavioral' morale. The reason for this distinction is obvious. While a civilian's attitudes may be seriously depressed by bombings, it does not necessarily follow that this attitude change will result in a behavioral change. In other words, it is quite conceivable that Allied bombing might have seriously effected attitudinal depression of German morale, while having failed seriously to undermine their behavioral morale and therefore their ability to wage war.⁸

⁸Ibid., p. 42.

The 33 German intelligence reports mentioned previously constantly made this distinction between attitudinal and behavioral morale in the German population. These reports "invariably distinguished between 'Stimmung', which was the way people felt, and 'Haltung', which was the way they behaved. The interaction between 'Stimmung' and 'Haltung' was important; for so long as 'Haltung' remained satisfactory, the authorities could afford to ignore a certain lowering of popular morale."⁹ It is therefore inaccurate to assert that bombings failed to have an effect on German morale if the only indicator the observer utilizes is the behavior of the German population. It may well be that bombing affected their attitudinal morale seriously, but fell short of effecting any behavioral changes. The reason then for the attitudinal versus behavioral distinction is to discern, in an accurate and sensitive manner, the actual extent to which Allied bombing affected German morale.

EFFECT ON ATTITUDINAL MORALE

In establishing the effect of bombing on attitudinal morale the Survey report entitled The Effects of Strategic Bombing on German Morale began by selecting various indices or categories of civilian opinion that they felt reflected attitudinal morale. By obtaining the responses of study groups to questionnaires, the Survey investigators were able to evaluate the relative effect of different factors (including Allied bombing) on the various layers of attitudinal morale. The Morale Division

⁹ Ibid., p. 42.

report proved most enlightening and deserves careful consideration. (The categories are arranged so that the least significant or superficial attitudinal indicators are discussed first, the most significant, last.)

The least serious of the categories established as constituting attitudinal morale was what was termed the civilian's sense of "War Weariness." This category encompasses any feelings that a civilian might evidence regarding "being tired of the war." The Survey findings were that of the factors that induced war weariness, bombings were the most important. In the study group of 3,711 German civilians, 79 percent responded that "the heaviest trials on the domestic front were the air-raids."¹⁰ In evaluating this effect, however, it is important to realize that a "war wearied" individual would not necessarily be willing to accept unconditional surrender.¹¹ "War Weariness" is only a surface indicator of attitudinal morale and, by itself, does not reflect whether any serious undermining of morale has occurred.

It was found that Allied bombing also affected the category of attitudinal morale termed the civilian's "Confidence in Victory." The effect produced by bombing on this slightly more serious indicator of attitudinal morale, was, however, not so dramatic as the result produced in the war weariness category. Although the largest single group within the sample, 43 percent, admitted that air-raids had been the major factor causing them to lose hope in German victory, a nearly equal portion of

¹⁰ Ibid., p. 14.

¹¹ Ibid., p. 16.

the study, 33 percent, responded in the opposite extreme and maintained that the raids had not been a factor in their arriving at the conclusion that Germany could not win the war.¹² The Survey report cautioned against taking the 43 percent figure too literally since it seems that this question was posed in such a way that encouraged the affirmative response. Even so, it is obvious that Allied bombing undermined, but less dramatically than in the previous case, this category of attitudinal morale.

The manner in which the bombings produced this feeling of losing confidence in ultimate victory is quite removed from what would be expected and deserves some discussion. In Table 1, it is indicated that only 15 percent of a study group attributed air-raids as a cause for thinking the war lost. The factor given as being over one and one-half times as important as air-raids in affecting the civilian's confidence in victory, was the sense the Germans had of "Allied Superiority." The fact that this sense of Allied superiority was in large part produced by the passage of masses of Allied planes over Germany in the process of executing their bombing missions raises some interesting problems.¹³ It seems that it would be easy to argue from this evidence that the fleets of Allied bombers flying over Germany produced an effect of undermining the civilian's confidence in victory, equal to if not greater than the bombing itself. Unfortunately, data that considers this problem in greater detail was not encountered in research and it is therefore impossible to pursue this inquiry beyond asserting the existence of this factor.

¹² Ibid., p. 17.

¹³ Ibid., pp. 13-14.

TABLE 1: REASONS GIVEN FOR THINKING THE WAR LOST

Military Reverses	48
Allied Superiority	24
Air Raids	15
War Shortages	2
Miscellaneous	11

The Survey report also demonstrated that Allied bombing served to undermine the confidence of the German population in their leaders. Table 2 illustrates the responses of the study group in this regard. This data would indicate that 14 percent of the civilians living in bombed cities had lower opinions of Nazi leadership than did those civilians living in unbombed cities. The Survey investigators also made note of the fact that in 12 percent of the interviews, the respondents in the bombed group volunteered such comments as: "I felt we have only the Nazi to thank for this" and "In the bunker, people cursed the Fuehrer."¹⁴ Allied bombing obviously had an obvious effect on this important indicator of attitudinal morale.

TABLE 2: EXTENT TO WHICH THE AIR WAR UNDERMINED
CIVILIAN CONFIDENCE IN NAZI LEADERSHIP

	<u>% People in Unbombed Cities</u>	<u>% People in Bombed Cities</u>
Leaders had best interests of people at heart	62	48
Leaders did not have the best interest of people at heart	31	42
Qualified opinion or don't really know	7	10

¹⁴Ibid., p. 17

The most serious indicator of attitudinal morale was the category called the civilian's "Willingness to Surrender." Prior to the end of the war over 50 percent of the German population was willing to accept any terms that would bring an end to the war.¹⁵ This dramatic effect, however, was not solely attributable to the air offensive. "The military events of late 1942 culminating in Stalingrad, the North African reverses, and the mounting air offensive of 1943 convinced the Germans that the tide had turned irrevocably."¹⁶ The extent to which the air offensive can be credited with contributing to this defeatism is indicated by the responses of over 2,200 foreign workers interviewed by Survey personnel. These workers all served periods of forced labor in Germany and were able to observe the effect of bombings while living in German cities. Eighty-four percent of the Russian foreign workers, 75 percent of the Italians, and 71 percent of the French foreign workers, said that "the Germans they knew came to believe, as a result of the bombings, that they couldn't continue the war."¹⁷ These estimates, no doubt, exaggerate the relative contribution Allied bombings made to undermining this category of attitudinal morale, but they do, nevertheless, indicate that the bombings did contribute a good deal to achieving this final result.

It was emphasized by the Survey report that Allied bombings had failed to produce a hatred of the Allies and therefore had not in this

¹⁵ Ibid., p. 16.

¹⁶ Ibid., p. 16.

¹⁷ Ibid., p. 16.

way served to bolster morale, as had often been supposed. Approximately 50 percent of the respondents in a study conducted by the Survey team stated that they did not blame the Allies for air-raids. Only 30 percent admitted to harbouring feelings of resentment.¹⁸ Their report stated quite distinctly that the evidence did not support the supposition that increased bombing strengthened enemy morale because it increased hatred of the Allies. The fact that the proportion of people expressing resentment was approximately the same for both unbombed and heavily bombed communities, would also seem to support the conclusion that Allied bombing did not significantly bolster German morale.

Another inquiry into this problem, however, arrived at quite different conclusions. Irving L. Janis, in his book Air War and Emotional Stress, maintained that the findings of the Morale Survey report seriously underestimated the extent of anti-Allied sentiment that was produced by Allied bombing.¹⁹ Janis argued that the nature of the post-war interviews conducted by the Survey investigators, i.e. that they were conducted shortly after occupation by military men of the Allied occupation force, served to distort the findings by forcing a response that was not sincere from the respondents. Janis hypothesized that this was the main reason that the Morale Survey's data did not reveal any marked increase in the hatred of the Allies after air-raids. He suggests that, indeed, a considerable degree of anger and resentment was stimulated by air-raids. This anger,

¹⁸ Ibid., p. 22.

¹⁹ Irving L. Janis, Air War and Emotional Stress, p. 132.

however, was supposedly not channelled in any rational fashion. The victim of air attack experienced an irritability after being bombed that was "discharged against any readily available target. Air-raid victims have been observed to curse indiscriminately, castigating the Prime Minister and the Fuehrer, the Luftwaffe and the R.A.F., the neighborhood air-raid warden who had blocked off an unsafe street, and the aircrew whose bomb did the damage." ²⁰

It is not evident from the research which one of these perspectives is the more valid. The latter perspective, however, is certainly the more believable. Assuming the truth of this second perspective, it seems likely then that since the local officials were the more "available target" for the resentment of the bombed population, they no doubt received most of the bomb induced resentment and not the Allies.

In summary, it is obvious that Allied bombing did succeed in markedly depressing the attitudinal morale of the German population. ²¹ The bombings served to undermine attitudinal morale by "convincing the civilians of Allied superiority, both through the severity of the raids and through the unchecked passage overhead of fleets of Allied aircraft," ²² Bombing was attributed by 79 percent of one sample group as being the most important factor (on the domestic front) inducing a sense of war weariness in the German population. It also proved to be an important factor in undermining the population's confidence in Nazi leadership and in convincing the

²⁰ Ibid., p. 133.

²¹ U.S.S.B.S., The Effects of Strategic Bombing on German Morale, I, p. 1.

²² Ibid., p. 1.

civilian population that Germany must accept unconditional surrender. It is, however, important to realize that Allied bombing achieved these results in conjunction with various other factors affecting morale, of which it was not the most important.

EFFECT ON BEHAVIORAL MORALE

In establishing the effect of bombing on behavioral morale, the Morale Survey evaluated the changes, if any, that occurred in various behavioral categories. The investigators considered the rates of absenteeism in German industry, the productive efficiency of German industrial workers, the rates of crime in Germany, and finally, the extent to which subversive and oppositional activity against the Nazi government was facilitated by the undermining of German attitudinal morale. This section of the chapter will consider the Morale Survey's findings in relation to the nature of and extent to which each of these behavioral categories was affected by Allied bombing.

Absenteeism in the Siemens-Schuckert plant located in the city of Munich totalled 15 percent of its workers as early as March 1941.²³ This rate of absenteeism is accepted by the Morale Survey report as approximating the norm throughout Germany prior to the beginning of the air offensive.²⁴ After the air war against Germany began in earnest, plants located within heavily bombed cities frequently suffered as much as 30 percent absenteeism immediately following a heavy raid.²⁵ The fact that the

²³ Ibid., p. 55.

²⁴ Ibid., p. 54.

²⁵ Ibid., p. 57.

highest absenteeism was experienced by those areas that received the heaviest bombing was established conclusively by the U.S.S.B.S. research.²⁶ As the bombings "increased new kinds of excuses for and greater possibility of voluntary absenteeism, more and more Germans took advantage of them."²⁷ During the last few months of the war, the absenteeism rate in German industry approached 20 percent of all scheduled hours.²⁸ Examples of the extent to which absenteeism increased during the war and the extent to which it affected the productivity of industry are shown in Table 3.²⁹

TABLE 3: PLANNED WORK LOST THROUGH UNAUTHORIZED ABSENCE

	1942	1943	1944	1945
Ford C. Cologne (%)	1.5	3.5	4.5	----
Electroacoustic Neumenster (%)	---	3.0	6.0	16.0
Deutsche Schiffwerke Bremen (%)	1.5	2.0	2.0	4.5

The Survey investigators concluded that these increased rates of absenteeism "were attributable to bombing more than to any other single factor."³⁰

It was demonstrated by Morale Survey investigators that the efficiency of German workers suffered as a consequence of Allied bombing. In 19 major war plants in 17 German cities, managers were asked to comment on production loss, aside from declines that were attributed to absenteeism.

²⁶Ibid., p. 59.

²⁷U.S.S.B.S., Overall Report (European War), p. 98.

²⁸U.S.S.B.S., The Effects of Strategic Bombing on German Morale, I, p. 56.

²⁹Ibid., p. 60.

³⁰Ibid., p. 60.

Fifteen of the 19 reports asserted that there had been noticeable declines due to decreasing worker efficiency. The respondents estimated that this decline in efficiency resulted in a 2 to 50 percent decline in production in these plants. Generally, however, it is thought that this loss in efficiency amounted to not less than 10 percent of overall German production.³¹ (At the end of the war, this figure is estimated by German authorities to have been as high as 20 percent.³²). In 15 of the 17 responses to the questionnaire, "all refer to some degree of loss in productivity, commonly described as due to fatigue and nervousness." The Morale Survey concluded that the greater part of this loss in worker efficiency was due to morale factors, produced primarily by Allied bombing.³³

Allied bombing also proved to be a contributory factor in increasing the crime rate in Germany during World War II.³⁴ Statistics related to this problem are, however, confusing and present more than the characteristic difficulty regarding interpretation. The Morale Survey cautioned that even though the criminal statistics in most cities suggest that little change and in some cases even a decline occurred in the rate of criminal behavior during the war, the opposite, in fact, happened. The investigators explained this assertion by noting that during the war, city populations generally decreased markedly as a result of large scale evacuation.

³¹Ibid., pp. 61-62.

³²U.S.S.B.S., Area Studies Division Report, p. 11.

³³U.S.S.B.S., The Effects of Strategic Bombing on German Morale, I, p. 62.

³⁴Ibid., p. 93.

The Survey report stated that the apparent trend of criminal behavior in Hamburg was downward but it noted that at the same time the population of Hamburg had dropped from a prewar figure of 298,400 to a figure of slightly above 100,000 in 1944.³⁵ These two trends when considered together demonstrate that, in fact, the criminal rate in German cities increased throughout the war. The Morale Survey after considering these facts concluded that: "Where bombing occurred, it served to provide occasions and facilitate conditions for gang activity; routines and sentiments of 'delinquent' type became so thoroughly integrated with the bombing situation that people were given the wrong impression that bombing was a major factor in the delinquency itself. In those parts of Germany where bombing did not occur, black-outs, and alarms operated in the same way."³⁶

In addition to encouraging an environment for crime, it was discovered that bombing also served to encourage oppositional groups in Germany. The Morale Survey team discovered that the general population seemed to be more willing to listen to the arguments of subversive groups because of Allied raids. It was also discovered that the increased intensity of air-raids during 1943 and 1944 probably had a "direct bearing on the decision by the 'July 20' group to take action."* In this sense, the bombings were a factor in encouraging the rejection of Hitler by this conspiratorial group. However, while mentioning these and other incidents

³⁵ Ibid., p. 88. These figures are indicative of the population changes in the central core of the city and do not represent total population.

³⁶ Ibid., p. 90.

* Ibid., p. 102. Also see the book by Erich Zimmermann and Hans-Adolf Jacobsen (eds.). Germans Against Hitler, July 20, 1944 (Bonn, Germany: Press and Information Office of the Federal Government of Germany, 1969), p. 113.

where Allied bombings encouraged oppositional groups, the Morale Survey did emphasize that incidents of sabotage and outright defiance of the Nazi regime were rare.³⁷

In conclusion, the serious effects of Allied bombing on German morale seem to have been limited to increasing the rates of industrial absenteeism and in decreasing worker efficiency. The Morale Survey estimated that at minimum the combination of these factors resulted in a 25 percent loss in productivity for German industry during the war.³⁸ The Morale Survey concluded in this regard that "a sizeable share of the total loss was due to bombing, because of its immediate and palpable effects."³⁹

Yet, despite these behavioral effects, declining morale failed to produce any noticeable degree of mental breakdown, panic or mass demoralization among German workers, as had been anticipated. Even as late as the summer of 1944, when the military situation left the major portion of the German population in a hopeless state, most Germans, traditionally obedient and industrious, "simply carried on in routine fashion."⁴⁰ The Survey investigators hypothesized that apathy engendered by the air attacks in some sense may have made the population even more readily subject to Nazi control. Simply stated, the psychic state of the general population deteriorated as a result of Allied bombings, but the response of the

³⁷ Ibid., pp. 102-103.

³⁸ Ibid., p. 65

³⁹ Ibid., p. 65.

⁴⁰ Ibid., p. 65.

general population to air-raids seldom escalated into mass panic. The bombings failed to reduce the German population from a state of relatively high "behavioral" morale.⁴¹

THE IMPACT OF DECLINING MORALE ON THE GERMAN WAR EFFORT

Most of the important segments of the German war economy were able to absorb the production losses that have been attributed to the lowering of German morale. Through various methods of industrial rationalization, i.e. standardization, concentration in larger firms, substitution, Germany was able to sustain her war effort. These measures more than compensated for the production loss produced by declining morale.⁴²

German morale, however, did reach a low point that was injurious to the German war effort in late 1944 and 1945. The factors that induced this critical decline in behavioral morale seem to have stemmed from the overall collapse of the German war effort rather than from any single cause, such as Allied bombing.⁴³ Even so, it is important to keep in mind that despite all the hardships forced upon the German workers, until late 1944, German workers continued to work.⁴⁴ The U.S.S.B.S. Overall Report (European War) summarized the effects the bombings had upon morale in these terms: "Allied bombings widely and seriously depressed German civilian morale, but depressed and discouraged workers were not necessarily

⁴¹Irving L. Janis, Air War and Emotional Stress, p. 153.

⁴²U.S.S.B.S., The Effects of Strategic Bombing on German Morale, I, p. 54.

⁴³Ibid., p. 7.

⁴⁴U.S.S.B.S., Summary Report (European War), p. 4.

unproductive workers."⁴⁵ The Morale Survey ended by giving the effect of morale induced losses in German production the benefit of the doubt in evaluating their significance. The report stated that: "War production, good as it was until mid-1944, might have continued to rise if morale had not been depressed."⁴⁶ Essentially then, while Allied bombing seriously affected German attitudinal morale and to a certain extent even behavioral morale, this effect certainly did not prove to be decisive in the war against Germany.

⁴⁵U.S.S.B.S., Overall Report (European War), p. 48.

⁴⁶U.S.S.B.S., The Effects of Strategic Bombing on German Morale, I, p. 53.

CHAPTER VIII

THE EFFECTS OF AREA BOMBING ON GERMAN PRODUCTION

Thus far we have established that, while the Allied bombing of German civilians did succeed in depressing morale to a significant degree, this depression of morale failed to seriously affect the German war effort. Since the Royal Air Force aimed the main portion of its bomb load on cities in hopes of undermining civilian morale and ultimately defeating the German war effort, the strategy of area bombing necessarily failed to live up to the theoretical expectations of its proponents. This, however, does not eliminate the possibility that area bombing might have decisively affected the German war effort in some way not anticipated by the military strategists. The most obvious area that needs consideration in this regard, is the degree to which Allied area attacks affected German production in ways not related to the effects produced by declining morale. It is the task of this chapter to deal with this problem. First, the extent to which these city bombings undermined German production as a direct result of bomb damage will be considered. Second, the sectors of the German economy that were most affected by this production loss will be mentioned and the nature of their loss discussed. Finally, the extent to which the bomb damaged-induced production loss from area raids served to undermine the German war effort will be considered.

EXTENT OF PRODUCTION LOSS PRODUCED BY BOMB DAMAGE FROM AREA RAIDS

In investigating this problem the Survey investigators were forced to abandon any attempts to isolate the effects of area raids after the

middle of 1944. Production after this period "was subjected to so many influences--such as the loss of foreign territory, the breakdown of transport, and the increasing oil stringency--that the effects of the city attacks on production are lost in a confusion of other causal factors." ¹ The Survey report specifically assigned to investigate this problem, the Area Studies Division Report, abandoned any attempt to analyze the effects of area bombing during this latter period. The Survey team based its analysis and conclusions upon an investigation of the effects area bombing had on production during the period prior to June 1944. ² The effects that city raids produced during this earlier period were not lost in a confusion of interacting variables and could be more easily distinguished from other factors responsible for production loss.

The Survey personnel reasoned that the effects that evidenced themselves in this early period would provide an accurate insight into the overall effect city raids had on German production. This assumption seems valid especially after one considers the following data. The study period for the Area Studies group accounted for 48 percent of the total amount of bomb tonnage released in city raids. ³ In addition, one-half of the civilian casualties inflicted by the Allied raids occurred prior to June 1944. ⁴

¹U.S.S.B.S., Area Studies Division Report, p. 6.

²Ibid., p. 6.

³U.S.S.B.S., Oil Division Final Report: Appendix, p. 48a.

⁴U.S.S.B.S., The Effects of Strategic Bombing on the German War Economy, p. 39.

Statistically then, this period provides more than a representative sample from which to base intelligent conclusions regarding the effects of city raids on German industrial productivity.

The Area Studies Division Report concluded that a heavy area attack on a German city generally resulted in an estimated 55 percent production loss for the city as a whole. However, following the attack a gradual recovery of production capabilities would within three months return production to 80 percent of the pre-raid capacity. In the course of six to eleven months, assuming the city was not attacked a second time, production would have fully recovered.⁵ It is difficult to approximate what proportion of this loss was due to the effects of declining morale as opposed to the more direct effects of area raids, i.e. bomb damage to plant facilities and machinery is a direct effect, while absenteeism is an indirect effect. But the Area Studies Report did arrive at the estimated distribution represented in Table 4.⁶

TABLE 4: DISTRIBUTION OF PRODUCTION LOSS PRODUCED BY AREA RAIDS

PRODUCTION LOSS DUE TO BOMB DAMAGE

Direct Damage to Factories	22.5
Replacement and Repair (Bldgs. and Raw Materials)	38.5
Houses and Household Possessions	12.0

PRODUCTION LOSS ATTRIBUTED TO THE DECLINE IN MORALE

Absenteeism	27.5
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⁵U.S.S.B.S., Area Studies Division Report, p. 7.

⁶Ibid., p. 17.

The greater importance of the effects produced by bomb damage, as distinguished from the effects produced by morale factors, is clearly demonstrated by this data. The Over-all Report (European War) concluded that: "Production losses due to morale effects upon absenteeism and man-hour productivity were very much less than direct losses resulting from bomb damage to plants." ⁷ Certainly then, the greater effect that area bombing had on the German war effort was of this direct nature. Let us now investigate exactly what the nature of this effect was.

NATURE OF PRODUCTION LOSS PRODUCED BY BOMB DAMAGE FROM AREA RAIDS

Armaments production had never been a target of Allied attack because the industry was considered too widely dispersed to be operationally feasible to destroy. ⁸ Given this fact, it is not surprising to discover that area raids for a long time affected munition production only slightly. Prior to the summer of 1943, the effect of these attacks was not significant enough to be noticeable. ⁹ The Over-all Report (European War) concluded that during this period armament production "was not significantly smaller as a result of air-raids . . . than it would have been otherwise." ¹⁰ The relative impotency of area attacks on German production is indicated by the fact that the index of total munitions output reached its peak as late as July, 1944. ¹¹

⁷U.S.S.B.S., Over-all Report (European War), p. 98.

⁸Ibid., p. 81.

⁹Ibid., p. 36.

¹⁰Ibid., p. 37.

¹¹U.S.S.B.S., The Effects of Strategic Bombing on the German War Economy, p. 198.

Despite the inability of area bombing to produce any effects of significance on the German munitions industry in general, area raids did produce some effects of significance on specific components of the munitions industry. Area bombing was reported to have been responsible for imposing handicaps on ammunition production that resulted in a 22 percent reduction of ammunition being delivered to the battle fronts in 1944.¹² In addition to the fact that the air offensive diverted nearly a million men to defensive roles, it also tied down a considerable number of anti-aircraft guns and ammunition. Two sources estimated that the strength of German artillery might have been at least doubled had it not been necessary to divert this equipment to the defense of the homeland against air attacks.¹³ Another source stated that the supply of artillery ammunition in 1943 would have been increased by one-third had it not been for the requirements of anti-aircraft guns.¹⁴ In 1944, however, statistics suggest that anti-aircraft guns absorbed 9 percent of the total ammunition production.¹⁵ If this 9 percent diversion in production is added to the 14 percent of ammunition production destroyed directly by bombings, the the total effect of Allied bombing on ammunition production amounts to a

¹² Ibid., p. 190.

¹³ Ibid., p. 41, Albert Speer. Inside the Third Reich (New York, N.Y.: The Macmillan Company, 1970), p. 279.

¹⁴ U.S.S.B.S., The Effects of Strategic Bombing on the German War Economy, p. 190.

¹⁵ Ibid., p. 170.

loss of 23 percent. It would thus appear that even though ammunition production was adequate until mid-1944, ammunition production could have been 23 percent higher in 1944 had there not been the need for diversion raised by Allied bombing.¹⁶

Area raids also failed to have any decisive effect upon the capital equipment industry in Germany. Even though the machine tool manufacturers were the most important industrial group affected by these attacks, the damage inflicted on this industrial group was not significant.¹⁷ The German machine tool industry gave no indication of strain during the war--operating throughout the war on a single shift basis of production.¹⁸ It was estimated that no more than 6.5 percent of Germany's machine tools were damaged or destroyed as a result of Allied bombing. Because this industry possessed a large reserve stock of equipment and suffered very little damage by bombings, the machine tool industry was able to divert 30 percent of its productive capacity to direct munitions production.¹⁹ With regard to the position this industry occupied in supporting the German war effort, one Survey report stated: "The machine tool industry, with its flexible and dispersed organization and its large reserve

¹⁶Ibid., p. 190. Area attacks shared this effect in conjunction with precision bombing. While it is impossible to separate the significance of each method of bombing over the other in this regard, it is arguable that the diversion would have been necessary under either approach. It is also worth noting that Alan Milward in his The German Economy at War cites a different set of statistics than those mentioned here. "The total damage suffered by the armament programme as a result of air attack during the year 1943 was not considerable. With regard to the year 1944, on the other hand, it may be assumed that on the average there was a fall in production amounting to 30 to 40 per cent". . . (See page 116)

¹⁷U.S.S.B.S., Over-all Report (European War), p. 22.

¹⁸U.S.S.B.S., The Effects of Strategic Bombing on the German War Economy, p. 8.

¹⁹U.S.S.B.S., Area Studies Division Report, p. 22.

capacity, became one of the potent recuperative factors that enabled Germany to sustain a high and rising level of munitions output."²⁰

Damage that resulted from Allied area attacks appears to have had little effect on the amount of factory space available to German industry. Construction in the Reich of new factories never increased at an abnormal rate that would indicate that this factor presented any problems to German industry.²¹ It was observed that the large scale dispersal of German plants, in response to Allied raids, "were carried out without being handicapped by a shortage of factory space."²² "Means were always found to provide German industry with factory space in which to continue essential production."²³

The 676,846 tons of bombs dropped on area targets must have effected something? Yet, the 55 percent loss in production described in the fourth paragraph of this chapter has not been accounted for. While it has been shown that the production loss in the munitions and the capital equipment industry produced by area raids could not possibly account for any appreciable percentage of this 55 percent total, it is still unclear upon what segment of the German economy this loss fell. In order to discover an answer to this question, we need to direct our attention

²⁰U.S.S.B.S., The Effects of Strategic Bombing on the German War Economy, p. 49.

²¹Ibid., p. 7.

²²Ibid., p. 9.

²³Ibid., p. 9.

to the German civilian supply industry.

The damage suffered by the civilian supply industry in cities accounted for the major portion of the 55 percent production loss which resulted after a heavy raid on a German city. An example of the sort of destruction produced by area attacks during the war, was the near complete devastation by bombings of the German clothing industry. The fact that this industry was generally concentrated in the centre of the larger cities made it a repeated target of the area raids on German cities. One Survey report noted that as early as 1944, approximately 80 percent of the dress manufacturing industry in Berlin was destroyed. The significance of this degree of destruction is evident when the fact is made known that Berlin accounted for approximately 80 percent of the national production of clothing prior to the Allied air offensive.²⁴ Before the summer of 1943, the general shortage of textiles and clothing in Germany had resulted from the inability to import these materials. At this stage of the war, clothing shortages, however, had not been serious. By mid-1943, the increased severity and frequency of area attacks changed this situation drastically. After the July-August raids on Hamburg, the demand for clothing for bombed civilians increased by 200,000 clothing units per month. (A unit is a complete outfit for two persons.) By the end of 1943, the output of the clothing industry was characterized by officials as being two-thirds below the standards set for "minimum wartime needs." By August of 1943 this problem became so serious that all rationing of clothing was stopped

²⁴ Ibid., p. 134.

and these items could not be purchased without special purchase permits, which were distributed after a civilian demonstrated urgent need.²⁵

The theory behind the destruction of the civilian economy seemed sound enough to military strategists during the war. In theory, an attack on the civilian supply industry could be executed to the extent where "available supplies of basic consumer goods (especially food, clothing, and shelter) were reduced to a level which would critically impair working efficiency and might ultimately destroy the ability or will to fight."²⁶ The problem was that even this sort of vague target system required a great deal of selectivity in attacking. And this was precisely what the arbitrary destruction wrought by area attacks did not produce.

By definition, area attacks were non-selective in character, having as their aiming points the most built-up area of a city. Because of this fact there was little consistency in terms of the effects produced upon particular branches of manufacturing in the civilian goods industry (or for that matter on industries in general).²⁷ Whether or not a given industry were destroyed, as well as whether or not the industry destroyed was of any strategic importance, were both matters of chance with this sort of air-raid. The loss fell where the bombs chanced to fall--and this was upon everything in general and consistently upon very little,

²⁵Ibid., p. 134.

²⁶Ibid., p. 129.

²⁷Ibid., p. 129.

if anything, of any strategic importance. In this random destruction important industries occasionally suffered but this was the exceptional case rather than the rule. "Losses inflicted by area attacks fell mainly on industries relatively unessential to the war effort."²⁸ The Allied bombings of German cities failed therefore to produce any "system of destruction" in their attacks, and this was the main reason why the large degree of production loss inflicted on this sector of the German economy was not an important factor in undermining the German war effort.²⁹

TOTAL PRODUCTION LOSS PRODUCED BY AREA BOMBING

The British counterpart to the United States Strategic Bombing Survey, in terms of being the official study of the effects of the air offensive against Germany, was the British Bombing Survey Unit. Both the U.S.S.B.S. and B.B.S.U. groups shared the same data but the analysis and interpretation of the data were done independently. The British Survey, however, was a much smaller group and produced a less extensive report of the effects of the offensive. This is being mentioned because both U.S.S.B.S. and B.B.S.U. reports made estimates as to the total amount of production loss effected by area bombing. Their estimates differ markedly from one another and this is probably due to their differences in composition. In any case, the estimates of "total" production loss made by the

²⁸U.S.S.B.S., Over-all Report (European War), p. 74.

²⁹U.S.S.B.S., The Effects of Strategic Bombing on the German War Economy, p. 137.

British Bombing Survey Unit appear in Table 5³⁰ and those estimates made by the United States Strategic Bombing Survey appear in Table 6.³¹

TABLE 5: B.B.S.U. ESTIMATES OF TOTAL PRODUCTION LOSS

TYPE OF PRODUCTION	% 1942	% 1943	% 1944	% 1945
War	0.25	5.6	1.9	1.2
All	0.56	10.9	11.6	9.7

TABLE 6: U.S.S.B.S. ESTIMATES OF TOTAL PRODUCTION LOSS

TYPE OF PRODUCTION	% 1942	% 1943	% 1944	% 1945
All	2.5	9.0	17.0	6.5

It is not surprising that there is such a wide range of variability in these two estimates. By nature of the problem, one would expect such variance, even given the fact that both Surveys relied on the same data. What is of importance is the conclusions made by each Survey regarding the effectiveness of this production loss in terms of undermining the German war effort. In this last section, the independent conclusions of each Survey on this problem will be considered.

³⁰Sir Charles Webster and Noble Frankland, The History of the Second World War: The Strategic Air Offensive Against Germany, 1939-1945, IV, p. 49.

³¹U.S.S.B.S., Over-all Report (European War), p. 74.

THE IMPACT OF PRODUCTION LOSS ON THE GERMAN WAR EFFORT

The only guideline or basis by which it can be determined whether or not a given production loss served to undermine the German war effort is defined quite simply by the U.S.S.B.S. Area Studies Report. "Production loss has an important influence on an enemy's ability to carry on a war only if it deprives the enemy of commodities which it needs for its military machine or to sustain its civilian population at a minimum level."³² Two U.S.S.B.S. reports had the following conclusions regarding the extent to which area bombing accomplished either of these two categories of deprivation:

Although attacks against city areas resulted in an over-all production loss estimated at roughly 9 percent in 1943 and perhaps as much as 19 percent in 1944, this loss did not have a decisive effect upon the ability of the German nation to produce war material. The lack of decisive effect was due primarily to the fact that the direct loss imposed was of a kind which could be absorbed by sectors of the German economy not essential to war production, while the direct loss fell on industries easily able to bear the burden.³³

As to the effect of bomb damage on the civilian economy, there is no evidence that the shortage of civilian goods ever reached a point where the German authorities were forced to transfer resources from war production in order to prevent the disintegration of the home front.³⁴

The Over-all Report (European War) confirms the fact that losses induced by area attacks were concentrated mainly upon industries that

³²U.S.S.B.S., Area Studies Division Report, p. 19.

³³Ibid., p. 23.

³⁴U.S.S.B.S., The Effects of Strategic Bombing on the German War Economy, p. 13.

were not essential to the German war effort.³⁵ A factor that in large part explains why area attacks had such a limited effect on German industry as well,³⁶ is that "as a rule the industrial plants were located around the perimeter of German cities and characteristically these were undamaged."³⁷ This occurred by nature of the fact that area raids were generally aimed at the centre of a German city.

Essentially, the British Survey developed the same conclusion as did the United States Survey. The only difference was that the British report was a good deal less diplomatic and more pragmatic in expressing its findings. Whereas the effects of the decline of morale among the German population produced by area raids were characterized by the U.S.S.B.S. Over-all Report (European War) as being "minor, but not negligible" regarding its effects upon the decline in German production in late 1944,³⁸ the British Survey concluded that the 'overall contribution of area bombing' to the fall in German production was both minor and negligible. The conclusion of the British Bombing Survey Unit was that:

. . . area attacks against German cities could not have been responsible for more than a very small part of the fall which had actually occurred in German production by the spring of 1945, and . . . in terms of bombing effort, they were also a very costly way of achieving the results which they did achieve.³⁹

³⁵ U.S.S.B.S., Over-all Report (European War), p. 74.

³⁶ Sir Charles Webster and Noble Frankland, The History of the Second World War: The Strategic Air Offensive Against Germany, 1939-1945, I, pp. 53-54.

³⁷ U.S.S.B.S., Summary Report (European War), p. 4.

³⁸ U.S.S.B.S., Over-all Report (European War), p. 98.

³⁹ Sir Charles Webster and Noble Frankland, The History of the Second World War: The Strategic Air Offensive Against Germany, 1939-1945, IV, p. 49.

CHAPTER IX

ALLIED CITY CENTRE ATTACKS: A CRITIQUE

The weaponry that proved decisive in defeating Germany is a topic of lively debate and speculation. Each military service asserts that the weaponry which forms its central core contributed decisively to Germany's defeat. The air force maintains that the strategic use of air power proved decisive. The army maintains that the infantry proved to be the key element in inducing Germany's defeat. While the topic is still seemingly open to debate, it would appear that neither of these claims is realistic. The generally accepted conclusion of military historians is that close cooperation between tactical aircraft and mechanized transport vehicles on the battlefield proved to be decisive factors effecting military success in World War II. This hypothesis, for example, is asserted by the military historian Walter Millis:

The one great, determining factor which shaped the course of the Second World War was not, as is so often said and so generally believed, independent air power. It was the mechanization of the ground battlefield with automatic transport, with the "tactical" airplane and above all with the tank. Air power in its independent forms was, in sober fact, relatively ineffective.¹

What proved to be the decisive weapon in the last world war is not the central topic of discussion here. But this problem does offer a convenient means of establishing the fact that the strategic

¹Cited in Perry McCoy Smith. The Air Corps Plans for Peace, 1942-1945 (Baltimore, Maryland: The John Hopkins Press, 1970), p. 35.

PART IV

THE COMBINED ALLIED BOMBING OFFENSIVE AGAINST THE
GERMAN CIVILIAN IN RETROSPECT

air offensive certainly does not occupy this position. The fact that the strategic use of the airplane proved to be an impotent or at least disappointing element of the war against Germany is a fact corroborated by nearly every reputable source.² This, however, need not have been the case. The strategic air offensive could have conceivably brought the war to an end much sooner had air power been used intelligently.

The most obvious deficiency in strategic thinking was the British policy of expending tremendous amounts of bomb tonnage on German city centres. Albert Speer, Reich Munitions Minister, asserted that "the war could largely have been decided in 1943 if instead of the vast but pointless area bombings the planes had concentrated on the centres of armaments production."³ Even given the technical handicaps of the British, this target system was certainly the more intelligent one to attack. Because this industry was virtually unprotected by either fighters or anti-aircraft guns, which would have allowed daylight low-level precision attacks to be successfully executed without risk, it can also be argued that it was also the more operationally feasible target system to attack as well.

An example of the vulnerability of another target system is evidenced by the attack executed by two Halifax bombers on the Schoenebeck powder plant during the war. Only 4.3 tons of incendiaries and 2 tons of high explosives were dropped on the target but the results

²Liddell Hart, Liddell Hart's History of the Second World War, p. 612. Michael Howard, Studies in War and Peace (London, England: Maurice Temple Smith Ltd., 1959), pp. 144-145. Stefan T. Possony, Strategic Air Power (London, England: Gerald Duckworth and Co. Ltd., 1955), pp. 106, 109 and 110-113.

³Albert Speer, Inside the Third Reich, p. 280.

were that 50 percent of the TNT production of this plant was permanently destroyed.⁴ The Survey report that mentioned this attack noted that "when one considers that it took hundreds or even thousands of tons of bombs on other types of plants to get similar effects, these results are amazing."⁵ It would have required the destruction of only 7 out of a total of 35 of these powder and explosive plants to have undermined Germany's ability to continue the war.⁶

The explosive and powder plants were not the only other vulnerable target system in Germany. The German railroad and canal transportation networks also constituted an important bulwark of the German war effort. Once the American Air Force finally began to concentrate significant amounts of bomb tonnage on these transportation targets (in September of 1944) the detrimental effects on German industry were felt immediately.⁷ Between May 1944 and January 1945, transportation bottlenecks created by these attacks were responsible for over half of the reported 22 percent decline in total output of finished goods in German industry. The significance of this belated attack on transportation targets is indicated by the Survey's investigation. The report entitled The Effects of Strategic Bombing on German Transportation concluded that "the consequences of the break-down in the transportation system were probably greater than any other single factor in the final collapse of the German economy."⁸

⁴U.S.S.B.S., Oil Division Final Report, p. 63.

⁵Ibid., p. 63.

⁶Ibid., p. 62.

⁷U.S.S.B.S., Overall Report (European War), p. 61.

⁸U.S.S.B.S., The Effects of Strategic Bombing on German Transportation, p. 3.

It is interesting to note that even this decisive transportation bombing policy was arrived at unintentionally. American military intelligence had not initiated the attack on German transport with any strategic motive in mind. There had been "no basic study of the flow of German economic traffic and its handling with a view to devising a system of rail targets designed seriously to diminish significant flows." ⁹ Tactical considerations (the immediate ground support of military operations) determined the initiation and specific nature of the offensive against transportation targets. It was only as a consequence of the overwhelming magnitude of these operations that the decisive effects on the German transport system were produced. ¹⁰ The U.S.S.B.S. investigators concluded that had the "strategic pattern of attack been developed and applied . . . more rapid results would have been secured." ¹¹ Liddell Hart concluded in his History of the Second World War that had Allied bombing of this and other key industrial targets been initiated earlier, the war would have been shortened by a minimum of several months. ¹²

CONCLUSION

The Allies' failure to initiate a combined bombing offensive against these previously mentioned and other vulnerable elements of the German war machine (i.e. the German Chemical, Rubber, Munitions, Electric Power Industry, etc.) and the allocation of such a large

⁹ Ibid., p. 4.

¹⁰ Ibid., p. 4.

¹¹ Ibid., p. 4.

¹² Liddell Hart, Liddell Hart's History of the Second World War, p. 612.

percentage of Allied bomb tonnage to attacking German cities is indicative of the moral and intellectual bankruptcy evidenced repeatedly by all belligerents in the Second World War. The fact that the Allies won the war and necessarily chose to ignore a good deal of their own bestial behavior in subsequent historical inquiry does not alter the fact that it occurred. The combined Allied bombing offensive against the German civilian was certainly one example of such behavior.

The most famous military historian would seem to also agree with my characterization and evaluation of these Allied raids. Regarding the British policy of indiscriminate bombing of German civilian populations, Liddell Hart criticized British strategists for having "pursued area-bombing long after they had any reason, or excuse, for such indiscriminate action."¹³ Stefan Possony, author of the book entitled Strategic Air Power, similarly criticized the British policy. His remarks revolved around the Allies' inability to select and execute bombing operations on decisive target systems. Possony views the city centre attacks as a very unimaginative and indiscriminate method of executing the war. He commented in this regard that . . . "Total destruction is a strategy of irresponsibility and lack of imagination."¹⁴

¹³ Ibid., p. 612. In another source Captain Hart talked of the air offensive against civilians as "the most uncivilized method of warfare the world has known since the Mongol devastations." F.J.P. Veale. Advance to Barbarism (Appleton, Wisconsin: C.C. Nelson Publishing Co., 1953), p. 58.

¹⁴ Stefan Possony, Strategic Air Power (Washington, D.C.: Infantry Journal Press, 1949), p. 50.

The 544,860 tons of bombs released by the R.A.F. and the 131,986 tons of bombs released by the U.S.A.A.F. on German cities could certainly have obtained better results had they been dropped on any of the other target systems mentioned in this chapter. The official historians of the air offensive, Sir Charles Webster and Noble Frankland, suggest that the failure of the British to redirect their bomb tonnage to industrial targets at the end of the war singularly lengthened the conflict by several months.¹⁵ It is impossible to estimate the extent to which the overall concentration of bomb tonnage on city targets lengthened the war. However, it is evident from this research that this decision was significantly detrimental to the Allied war effort.

¹⁵ Liddell Hart, Liddell Hart's History of the Second World War, p. 612.

APPENDIX

APPENDIX I

THE ALLIED BOMBING OFFENSIVE AGAINST THE JAPANESE CIVILIAN

There is a danger in concentrating on a specific area of historical inquiry that the reader may be given a mistaken impression of the overall circumstances in which the problem being studied occurred. Through some sort of mental osmosis, what is not said often distorts the reality of what is delineated. In the case of this study, to simply investigate the civilian bombings executed by the Allies in the European theatre of the Second World War would give the reader the mistaken impression that the Royal Air Force was unique among the Allies in indiscriminately attacking civilians. While this was generally the case in the European theatre of war, it was not the state of affairs in the Pacific theatre.

A major portion of the bomb tonnage dropped by the United States Twentieth Air Force on Japan was similarly aimed at urban population centres. To counteract any misconceptions that result from historical "tunnel vision", this section of the Appendix devotes itself to considering briefly the nature and extent of the air offensive against Japan.

THE JAPANESE CITY AS A TARGET OF U.S.A.A.F. BOMBING

We are all familiar with the fact that the U.S. Air Force dropped atomic bombs on the cities of Nagasaki and Hiroshima. The wholesale destruction produced in these two cities by the atomic devices is common knowledge and is still a topic for reconsideration and critical reflection. What is generally not known, however, is that these two atomic attacks were

in nearly every sense of gross measurement of destruction produced --
ANTICLIMACTIC.

In terms of the overall physical destruction of Japanese cities that had already been effected by conventional bombing, the contribution made by the atomic raids was minimal. As a result of these conventional bombing operations, 43 percent of the 66 largest Japanese cities had been completely destroyed prior to the Japanese surrender.¹ In the process of this bombardment, 2,500,000 homes were destroyed, displacing an estimated 30 percent of the Japanese urban population.² In the single raid on the city of Tokyo on March 9, 1945, over 15 square miles of the city's most densely populated area was completely destroyed.³ Following this raid, the U.S. Twentieth Air Force directed the major portion of its attack against the largest Japanese cities (Tokyo, Nagoya, Osaka, Kobe, Yokokama, and Kawakasi). Between March and April of 1945, these cities suffered the destruction of 53.5 square miles of their urban areas.⁴ This general and specific data concerning the magnitude of destruction produced by American conventional bombing of Japanese cities can be compared with the amount of destruction produced by the two atomic explosions. Hiroshima is reported

¹U.S.S.B.S. The Effects of Strategic Bombing on Japanese Morale (Washington, D.C.: U.S. Government Printing Office, 1947), p. 2.

²U.S.S.B.S. Summary Report (Pacific War) (Washington, D.C.: U.S. Government Printing Office, 1946), p. 17.

³Ibid., p. 17.

⁴U.S.S.B.S. The Effects of Strategic Bombing on Japan's War Economy (Washington, D.C.: U.S. Government Printing Office, 1946), p. 2.

to have suffered 4.7 square miles of destruction while Nagasaki suffered roughly 2.3 square miles destroyed.⁵ The destruction produced by atomic raids on Japanese cities totals only 7 square miles as compared to the more than 53.5 square miles of destruction produced by conventional bombing.

Using casualty figures as a comparative index, the atomic raids again do not illustrate the monopoly on destruction that post-war discussion of related topics implies they achieved. One U.S.S.B.S. report estimated that approximately 900,000 Japanese civilians were killed and another 1,300,000 injured as a result of the air war against Japan.⁶ (Another report suggested the minimum estimate of 330,000 killed and 476,000 injured.⁷) In the most destructive conventional raid, the attack on Tokyo on March 9th, casualties were estimated to have been on the order of 185,000, of which 80,000 to 100,000 were fatalities.⁸ These figures can similarly be compared to the estimates of casualties suffered at Hiroshima and Nagasaki. The Report of the British Mission to Japan estimated the fatalities at Hiroshima to have been between 70,000 to 90,000.⁹

⁵Ibid., p. 10.

⁶U.S.S.B.S., The Effects of Strategic Bombing on Japanese Morale, p. 2.

⁷U.S.S.B.S., Summary Report (European War), p. 20.

⁸Ibid., p. 20.

⁹Report of the British Mission to Japan. The Effects of the Atomic Bombs at Hiroshima and Nagasaki (London, England: Her Majesty's Stationery Office, 1946, p. 18.

Another source estimated that the atomic explosion at Nagasaki killed 35,000 civilians.¹⁰ Again it is clear that the atomic attacks were anti-climactic in terms of the destruction they contributed to the general devastation already produced in Japanese cities by conventional bombing.

A simple analogy may serve to communicate this fact more convincingly. The U.S.S.B.S. Summary Report (European War) came to the conclusion "that the damage and casualties caused at Hiroshima by one atomic bomb dropped from a single plane would have required 220 B-29's carrying 1,200 tons of incendiary bombs, 200 tons of H.E. bombs, and 500 tons of antipersonnel fragmentation bombs."¹¹ By adding together this tonnage and then dividing the resultant tonnage into the total bomb tonnage released on Japanese cities, a crude estimate of atomic explosive equivalent can be obtained for the sum total of conventional bombings aimed at Japanese cities. The figure 54.7 is the result. Therefore, the general devastation produced by the atomic attacks against Hiroshima was caused 54.7 times over by conventional bombs dropped on other Japanese cities.

The message that I am attempting to communicate is two-fold. First, the destruction produced by the two atomic explosions, in terms of civilian casualties and in terms of square miles devastated, was inconsequential as compared to that devastation which had already been caused to urban areas throughout Japan by conventional bombing. Second, and more

¹⁰U.S.S.B.S. The Effects of Atomic Bombs on Hiroshima and Nagasaki. (Washington, D.C.: U.S. Government Printing Office, 1946), p. 15.

¹¹U.S.S.B.S. Summary Report (Pacific War), p. 24. A total of 160,800 tons of bombs were dropped on the Japanese home islands. Of this amount, 104,000 tons, or 64 percent of this total amount of bomb tonnage, was dropped on 66 Japanese cities. See U.S.S.B.S. report Summary Report (Pacific War), p. v.

important, the character of the atomic raids--that they were directed against urban areas and ultimately against civilians--was not a policy deviant from the norms already practiced by the U.S. Twentieth Air Force. On the contrary, it was a policy of bombing conducted for the major part of the air offensive against the home islands of Japan.

The interesting fact is that not only were such attacks executed for the major part of the offensive but after March 9, 1945, precisely this sort of urban attack had target priority. Whenever it was operationally possible, the Tokyo type of urban attack was executed. To substantiate this fact, a brief survey of the evolution of American Air Force target systems in the Pacific war would seem appropriate. The air offensive against Japan was initiated at the end of November 1944. From this time until March 9, 1945, aircraft targets were assigned priority as a target system.¹² Raids upon urban centres began on a massive scale during March and continued until April, when the Twentieth Air Force found that it had dropped so much bomb tonnage in these area raids that the supply of incendiary bomb had been exhausted.¹³ The urban attacks were temporarily discontinued as a result of this problem but were resumed in the latter part of June when the incendiary supply was replenished. From this time till the surrender of the Japanese, urban area attacks remained the dominant type of American bombing raid. During this period, this form of

¹²U.S.S.B.S. The Effects of Strategic Bombing on the Japanese War Economy, p. 37.

¹³Ibid., pp. 37-38.

target system accounted for 70 percent of the bomb tonnage dropped by B-29's over the home islands of Japan.¹⁴

It is obvious, therefore, that the American bombing policy in Japan was not far removed from the sort of bombing policy practised by the British Air Force in Europe. It is odd, however, that the American bombing strategy in Japan should differ so markedly from the American strategy in Europe. (In the European theatre, both the Eighth and Fifteenth Air Force remained dogmatically faithful to a doctrine that put emphasis on the precision bombing of industrial and military targets.) The sources encountered that considered these seemingly contradictory American policies all asserted that operational reasons dictated the use of area attacks in Japan. The military strategists felt that against Japanese cities, "results of urban area attacks would be far more significant than they had been against Germany because of the greater fire vulnerability of Japanese cities and the importance of small industry to Japanese war industries."¹⁵ In addition, it was asserted "that the will of the Japanese people and its government to resist could be greatly weakened and perhaps destroyed by urban area attack."¹⁶

This insight into the air war in the Pacific theatre, in conjunction with the body of this essay, will make it clear that the policy of

¹⁴ Ibid., p. 38.

¹⁵ Ibid., p. 37.

¹⁶ Ibid., p. 37.

bombing civilian populations was not solely characteristic of Luftwaffe strategy during the Second World War. The destruction produced by Luftwaffe raids on England appear minute as compared to the civilian casualties and destruction inflicted on Germany and Japan by the Allied Air Forces. The casualty figures of English civilians killed in London as a result of Luftwaffe raids totals 30,080, while the estimates of the total number of deaths in all of England total 60,000.¹⁷ Alongside the casualty figures suffered by the German and Japanese civilian populations, these figures are of far reduced proportions. It is obvious that both the Allied and Axis powers practiced the bombing of civilian populations when and where it proved expedient to do so.¹⁸ (See the conclusion of Chapter II, page 19-20.)

¹⁷ Report of the British Mission to Japan. The Effects of the Atomic Bombs at Hiroshima and Nagasaki, p. 18.

¹⁸ If the reader is interested in pursuing this question he will find a discussion of this and related problem in Cy Caldwell's book Air Power and Total War, pp. 42-43 and p. 98.

APPENDIX II

THE EXTENT TO WHICH CIVILIAN CASUALTIES PRODUCED BY ALLIED
BOMBING REDUCED THE SIZE OF THE GERMAN LABOR FORCE AND
AND AFFECTED THE GERMAN WAR EFFORT

It is estimated that the Reich possessed a labor force (outside of agricultural employment) of approximately 24 million workers during World War II.¹ As was established in Chapter IV, approximately 500,000 German civilians were killed by Allied bombings. Consequently, the fatalities produced by Allied city attacks on Germany could amount to no more than 2 percent of the German labor force. Even if all these fatalities had been members of the German labor force, which a 2 percent figure would suggest, the effect such a small percentage of loss would have had on the German economy would probably still have been negligible. As was the case, however, the ultimate effect was even less than this 2 percent figure. Only approximately half of the 500,000 casualties produced by Allied raids were among members of the German labor force.² Taking this factor into consideration, the percentage of civilian casualties produced by Allied raids amounted therefore to only 1 percent of the total German labor force. Obviously, such a small magnitude of casualties was not a significant factor in effecting the German war effort.³

¹U.S.S.B.S., The Effects of Strategic Bombing on the German War Economy, p. 41.

²Ibid., p. 39.

³Ibid., p. 39.

Chapter IV also established the fact that the majority of the fatalities produced by Allied bombing probably occurred among women and children. It was estimated that men quite possible constituted only 30 percent of the fatality group. Given these facts, it follows that at least the majority of the 250,000 fatalities among the labor force produced by Allied bombings were among women workers. In attempting to estimate the effect this loss had on the German war effort, it is important to note that generally women were not employed in essential occupation in German industry. Usually women were confined to employment in the field of administration and unskilled labor. Ultimately then, the female employee was easy to replace in the case of her temporary or permanent absence.⁴ The fact that the majority of casualties that were produced by Allied bombing were among women served therefore to minimize even further the impact bombing induced casualties had on the size or quality of the German labor force. (See page 29 and 30 for a discussion of fatality distribution between men, women and children.)

In addition, it is worth noting that the German labor force was never fully mobilized during the Second World War. The extent of mobilization of the female worker in the German labor force is one example of this fact. While Britain had been forced during the course of the war to increase the number of women employed by 40 percent, the percentage of women employed in the German labor force remained practically unchanged.⁵ Another indication of the reserve capacity

⁴U.S.S.B.S., Area Studies Division Report, p. 10.

⁵U.S.S.B.S., The Effects of Strategic Bombing on the German War Economy, p. 9.

in German manpower was the continued reliance of the German government on a single shift economy. Throughout the war, 90 percent of German employees "were on the first shift, 7 percent on the second, and 3 percent on the third."⁶ Had German authorities been agreeable, production could have been increased markedly by extending activity in the second and third shift category. It would seem that even if the magnitude of casualties induced by Allied bombings had been markedly greater than they were, the German economy was such that a rational utilization of the manpower reserves and the reorganization of existant labor would have undoubtedly enabled Germany to continue its war effort.

⁶Ibid., p. 43.

APPENDIX III

CLASSIFICATION OF GERMAN CITIES BY THEIR BOMBING EXPERIENCE¹

CITY	1939 POPULATION	BOMB TONNAGE DROPPED
Hamburg	1,711,000	41,300
Munich	823,000	28,300
Stuttgart	458,000	27,200
Hannover	471,000	24,700
Cologne	772,000	47,000
Nuremberg	506,000	22,200
Bremen	424,000	27,300
Kiel	273,000	26,200
Frankfort-on-Main	639,000	29,500
Mannheim and Ludsigshafen	429,000	34,600
Duisburg	438,000	33,000
Essen	667,000	41,500
Mortmund	542,000	27,300
Duesseldorf	559,000	20,500
Gelsenkirchen	318,000	23,800
Braunschweig	196,000	17,700
Kassel	216,000	19,100
Emden	35,000	6,300
Mamm	59,000	11,000
Muenster	144,000	13,000
Osnabrueck	107,000	10,400
Wilhelmshaven	114,000	11,900
Karlsruhe	190,000	11,500
Koblenz	91,000	14,400
Mainz	158,000	11,100
Saarbrucken	133,000	12,200
Bochum	305,000	10,900
Oberhausen-Sterk	192,000	6,000
Wuppertal	162,000	7,000
Augsburg	186,000	6,300
Darmstadt	115,000	8,800
Friedrichshafen	25,000	5,200
Hanau	42,000	5,600
Regensburg	96,000	8,900
Schweinfurt	49,000	6,700
Ulm	74,000	6,600
Aachen	164,000	7,300
Krefeld	171,000	5,400
Muenchen-Gladbach	128,000	7,700
Neuss	63,000	7,400
Homberg	23,000	6,000

¹U.S.S.B.S. The Effects of Strategic Bombing on German Morale, I, p. 127. Survey personnel were not allowed access to the Soviet zone of occupation, consequently no bomb tonnage data was able to be collected on any city in the eastern zone.

APPENDIX IV

OVER-ALL ATTACK DATA OF COMBINED STRATEGIC AIR FORCES IN
 THE EUROPEAN THEATRE OF OPERATIONS¹
 (In Short Tons--2000 lbs.)

	GROUP I Cities & Areas	GROUP II Industry	GROUP III Transportation	GROUP IV Tactical Targets
<u>UP TO 1 MAY 1944</u>				
U.S.A.A.F.	44,141	38,165	30,452	63,796
R.A.F.	227,093	27,190	40,093	38,276
<u>1 MAY 1944 TO END</u>				
U.S.A.A.F.	87,845	205,540	351,953	173,444
R.A.F.	317,767	114,654	98,985	127,029
<u>TOTALS FOR BOTH PERIODS</u>				
U.S.A.A.F.	131,986	243,705	382,405	237,040
R.A.F.	544,860	141,844	139,078	165,305

TARGET GROUPS DEFINED

- GROUP I: Cities and Areas (Cities, Towns, Urban Areas and Unidentified Targets).
- GROUP II: Industry (Public Utilities, Government Buildings, General Manufacturing, Aircraft Factories, Armament and Ordnance Plants, Machinery and Equipment, Iron and Steel and Other Assorted Critical Industries).
- GROUP III: Transportation (Communication Facilities, i.e., Railroads, Waterways).
- GROUP IV: Tactical Targets (Naval Installations, Airfields and Aircraft, Ground Support).

¹U.S.S.B.S., Oil Division Final Report: Appendix, p. 48a.

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