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The Balance Sheet

The Costs and the Gains of the Bombing Campaign

David L. Bashow

Critics of the bomber offensive frequently argue that the materiel and human cost of the campaign far overshadowed the gains, and that the resources dedicated to it could have been more effectively utilized elsewhere. They have argued that the combat manpower could have been better used in the other fighting services, especially the army, and industry could have been used to produce more weapons for these fighting services. However, proponents of this line of thought assume that the weight of effort expended on the bombing campaign was inordinately high. Richard Overy maintains that it was actually rather modest. "Measured against the totals for the entire war effort (production and fighting), bombing absorbed 7 percent, rising to 12 percent in 1944–45. Since at least a proportion of bomber production went to other theatres of war, the aggregate figures for the direct bombing of Germany were certainly smaller than this. Seven percent of Britain's war effort can hardly be regarded as an unreasonable allocation of resources."¹ Further, although some significant infantry shortages were experienced in 1944, they never reached an extremely critical overall level and were eventually rectified. With respect to materiel, none of the services was conspicuously wanting for anything by 1943, and the British effort was thereafter bolstered by substantial North American war production.

The Down Side

Much of the criticism of the bombing campaign has focused on the human cost, the unquestionably heavy loss rates endured by Anglo-American aircrews, 81,000 of whom

forfeited their lives aboard 18,000 aircraft lost from all causes.² However, these losses need to be placed in perspective, especially when compared to the twenty- to twenty-seven million war deaths suffered by the Soviet Union. Nonetheless, the human cost of the campaign was formidable. During the entire period of the Eighth Air Force's operations over Europe, which included Pointblank from 10 June 1943 until April 1944, roughly 26,000 American airmen of that numbered air force alone were killed, while another 20,000 became prisoners of war.³ Bomber Command, in six years of war, lost 55,573 airmen, 47,268 on operations, and a further 8,305 due to training, non-operational flying accidents and other causes.⁴ Command aircraft losses from all causes totaled 12,330, of which 8,655 went down over Germany, Italy and Occupied Europe.⁵

During the war, Bomber Command's 125,000 airmen⁶ flew 364,514 sorties over Europe,⁷ and the majority of the Command tonnage was dropped from the summer of 1944 until the cessation of hostilities. To put the total campaign in perspective, by VE-Day 955,044 tons of bombs had been dropped on Germany, Italy, enemy occupied territory and targets at sea. Approximately 74 percent of the total tonnage was delivered after 1 January 1944, and 70 percent of the total after 1 July 1944, from which time forward the Bomber Command loss rates were greatly reduced.⁸ In round figures, 48,000 tons were dropped on European targets up until the end of January 1942, an additional 42,000 tons by year's end, another 158,000 tons in 1943 and the balance thereafter. Of the totals dropped on the European Axis powers during the war,

68.8 percent fell on the Reich itself, 30.19 percent on the enemy occupied territories, 0.94 percent on Italy and 0.07 percent on targets at sea.⁹ “If the bombing of Germany had little effect on production prior to July 1944, it is not only because she had idle resources on which to draw, but because the major weight of the air offensive against her had not been brought to bear. After the air war against Germany was launched on its full scale, the effect was immediate.”¹⁰ Overall loss rates for the entire war averaged 2.58 percent per raid, which, ironically, would almost provide that “50-50 chance of survival” on which the operational tour lengths were codified in 1943,¹¹ but only for the first tour of operations. It did not include the accidental fatal casualties, 6.64 percent of the wartime force, nor did it include another 3 percent who were seriously injured in these mishaps. Reduced to round numbers for the entire duration of the war, of every 100 airmen who joined Bomber Command, 38 were killed on operations, eight became POWs, three were wounded, seven were killed in operational accidents or in training, and three were injured in training.¹² Therefore, only 41 out of 100 escaped unscathed from any of the aforementioned categories, although not necessarily unscathed by all manners of measurement. Only the *Kriegsmarine*’s U-boat arm suffered greater overall casualty percentages on a sustained basis.¹³

As a subset of the larger picture, the Canadian story is considerably more positive. Of the 91,166 RCAF aircrew who commenced training under the terms of the BCATP, 75,668

or 83 percent graduated in one of the aircrew trades. Of this number, and factoring in a trained surplus-to-needs of 10,500 Canadian aircrew late in the war, approximately 50,000 RCAF BCATP graduates eventually served overseas.¹⁴ Bomber Command was far and away the majority employer of these graduates, and it is estimated that approximately 40,000 RCAF aircrew served either operationally or at an operational training unit with the Command at some time during the war.¹⁵

Here, one must note that both the total number of Canadian aircrew in Bomber Command service, as well as the total Canadian aircrew casualty figures, are surprisingly difficult to verify. In the absence of definitive overall figures, I have taken the liberty of making some reasonable assumptions, based on what is known. As we have seen, there were essentially three classes of Canadian aircrew in Bomber Command service:

Canadians in indigenous RCAF Bomber Command squadrons, or in 6 Group;

RCAF aircrew serving in RAF Bomber Command squadrons; and

The CAN/RAF airmen, Canadians in the direct employ of the RAF.

However, the undisputed total number of RCAF aircrew fatalities in Bomber Command is 9,919 of the 40,000 who served, of which 8,240 (20.6 percent) were killed on operations. They included RCAF members serving in 6 Group, 405 (Pathfinder) Squadron of 8 Group, and

The British Commonwealth Air Training Plan (BCATP) was one of the main sources of aircrew for Bomber Command. Here, instructors at No.5 Elementary Flying Training School at High River, Alberta, pose for a photo, circa 1941.





The young faces of Bomber Command. This crew is representative of the multi-national nature of Bomber Command. Back row (left to right): Pilot Officer M.F. Sanders (Australia); Flying Officer J.A. Anderson (Canada); Flight Sergeant Skeeter (Australia); Front row: Flying Officer A.P. McKillop (Canada); Sergeant A.S. Kenyon (United Kingdom); Sergeant F.W.J. Flippant (United Kingdom); Warrant Officer E.B. Jolanson (Canada) and Sergeant M.A. Gerrard (United Kingdom).

RCAF members serving with RAF bomber squadrons. A further 673 (1.68 percent) were wounded in action, and 1,647 (4.12 percent) were killed in operational accidents or training. Also, 1,849 (4.62 percent) would become prisoners of war, while 659 (1.65 percent) were injured in operational accidents or training.¹⁶ Compared to the overall war-long Bomber Command casualty rate, only 32.67 percent¹⁷ (vice the 59 percent Command average) of all RCAF Bomber Command aircrew became statistical casualties, although this figure does not include an estimated 737 of at least 1,106 CAN/RAF airmen, two-thirds of the total, who are believed to have served with Bomber Command in direct RAF service. Of the 1,106 total, at least 778 are known to have been killed either operationally or accidentally,¹⁸ and therefore a reasonable two-thirds extrapolation suggests a further 519 CAN/RAF Bomber Command fatal casualties can be added to the RCAF total, and subtracted from the British total. Similar cases can undoubtedly be made for other non-Britons on direct service in RAF units. Worthy of note, given the dynamic and wide-ranging nature of Bomber Command's war, many

of its casualties are simply categorized as "Missing – presumed dead."¹⁹ This is a poignant testimonial to the violent nature of their passing. For them, no burial plot or headstone was left to comfort loved ones and to mark their place of eternal rest. The skies over northwest Europe remain their cemetery. The Runnymede Memorial in Britain, dedicated in 1953, contains the names of 20,000 Commonwealth airmen of the Second World War who have no known graves. Included among them are the names of 3,072 Canadians. Others are commemorated and/or buried in locations as diverse as Bournemouth and Berlin.²⁰

There are a number of reasons for the significantly lower RCAF casualty rates. Although the CAN/RAF loss rate and that of RCAF aircrew serving in RAF squadrons essentially mirrored that of their British colleagues, Canadians were not present in large percentages during the very early days of Command operations when loss rates were relatively high. Nor did some aircraft fleets with the highest loss rates, such as the Manchester and the Stirling, ever equip RCAF bomber squadrons, although many Canadians crewed both types.



CFJIC PC 2479

Air Vice-Marshal Clifford M. "Black Mike" McEwen (standing right, under the nose of a Lancaster II) was the outstanding commander of Bomber Command's 6 Group RCAF.

percent of the known losses for the period, whereas the estimated 4,867 RCAF aircrew fatalities in RAF units during the time-frame represent 60.8 percent of the estimated totals. Again, these numbers are logical when spanning a period when losses would be expected to be relatively equal throughout the Command.

The lowest loss rate in Bomber Command was 6 Group's overall 2 percent per operation, and this impressive statistic is yet another reason why Canadian bomber casualties fell significantly below the wartime Bomber Command average. However, 6 Group was not yet in existence during many of the darkest early days of the bombing campaign. While it did stumble at the outset relative to the performance of the other groups, its initial high loss rates were somewhat mitigated by the three Wellington squadrons syphoned off as 331 Wing to support the Allied landings in Sicily and Italy.²⁵ However, there is no doubt that the requirement to send experienced crews in support of Operation Torch degraded the overall experience level of the crews available for 6 Group's early operational challenges and adversely affected the loss rates for those then flying out of Yorkshire. Late in the bombing campaign, during the last year, the group's performance was second-to-none. In fact, its overall wartime loss rate of 1.8 percent for Halifaxes and Lancasters combined was the best in Bomber Command. These results are also a resounding endorsement of the very high calibre of leadership and the professionalism fostered within 6 Group, particularly after it was placed under the guidance of Air Vice-Marshal Clifford M. "Black Mike" McEwen.

If one adds the estimated 519 Bomber Command fatal CAN/RAF casualties to the known 9,919 RCAF Bomber Command casualties, a reasonable estimate of overall fatal Canadian aircrew casualties during the campaign would be 10,438 out of 40,737 participants,²⁶ or roughly 25.6 percent of those who served.

However, there were periods of time when the odds against survival were particularly daunting. For example, with respect to 6 Group's

One should note that eleven RCAF Bomber Command squadrons had been formed prior to the official paper establishment of 6 Group in October 1942. However, the last six of those units were barely in existence prior to the group's official stand-up for operations in January 1943.²¹ In all, there were 4,203 known fatal 6 Group casualties during the 28 months of its operations.²² If a Canadianization rate of 75 percent is applied to this number for the duration of the group's existence,²³ an estimated 3,152 of 6 Group's 4,203 fatalities were Canadian. Subtracting this number and the 1,900 fatal RCAF Bomber Command casualties prior to 1 January 1943 from the 9,919 total wartime figure, it is estimated that 4,867 RCAF aircrew in RAF bombing squadrons forfeited their lives from 1 January 1943 until the cessation of all hostilities in August 1945. In the summer of 1944, there were approximately 10,200 RCAF aircrew in all RCAF squadrons overseas, and 16,000 RCAF aircrew in all RAF squadrons overseas.²⁴ These numbers represent 38.5 percent and 61.5 percent respectively of the totals of RCAF aircrew serving overseas, and the Bomber Command subset of these numbers would closely mirror this ratio. And the Canadian 6 Group losses of 3,152 represent 39.2

Halifax II/V operations between March 1943 and February 1944, the average monthly loss rate was 6.05 percent per operation, producing a mere 16 percent survival rate.²⁷ Between August 1943 and March 1944, the group's Lancaster II loss rate averaged 5 percent per operation, producing a concomitant 21 percent survival rate.²⁸ During the group's first year of operations, for those flying Wellingtons between January and October 1943, the loss rate averaged 3.6 percent, producing a survival rate of 34 percent.²⁹ That said, the February 1944 decision by Harris to restrict the Merlin-powered Halifax II/V squadrons from operations over Germany due to service ceiling limitations during a period of brisk operational tempo undoubtedly saved Canadian lives. An earlier decision to relegate Bomber Command Wellington squadrons to mostly Gardening operations during the summer and early autumn of 1943 similarly eased the losses in that community.³⁰

There is also no doubt that the particular time at which aircrew members commenced their operational tours significantly affected their chances of survival. Given a period of intense operational activity, it was not unusual for a crew to complete an operational tour within three calendar months, a common occurrence during the last year of the war. However, if, for example, those three months fell within the confines of the Second Battle of the Ruhr from March to July 1943, or the Berlin raids from November 1943 to March 1944, individual crew odds of survival were much less than, for example, those who commenced operations later in 1944. The later rates graphically illustrate how enormous the bombing weight of effort was during the final nine months of the war under increasingly favourable circumstances, and they somewhat mitigate the dreadful earlier statistics.

Accomplishments of the Bombing Campaign

So much for the losses...what of the gains? First, the gains were not only what was directly attributable to the bombing, such as the actual destruction of targets, but also constituted a host of indirect benefits brought on as adjuncts to the bombing. In Richard Overy's words:

From Galbraith onwards the view has taken root that the only thing that Bomber Command did, or was ordered to do, was to attack German cities with indifferent accuracy. The Bombing Surveys devoted much of their effort to measuring the direct physical damage to war production through city bombing. This has produced since the war a narrow economic interpretation of the bombing offensive that distorts both the purposes and nature of Britain's bombing effort to an extraordinary degree.³¹

While part of the bombing effort was to be directed at Germany's home front military and economic structures if the nation first attacked civilian targets in an indiscriminate manner, very large portions of the overall effort were directed at many other targets for which the Command's aircraft were needed. Again, as Overy mentions, not even half the Command's total wartime dropped bomb tonnage was dedicated to the industrial cities.³² Also, during the later stages of the campaign, even attacks against industrialized cities were frequently tactical rather than strategic, conducted as they were in support of the advancing Allied land armies. For much of the first four years of the war, support for the naval war comprised a significant portion of the Command's overall effort, while for much of 1944, it was extensively used in support of the invasion of northwest Europe. Additionally, Command aircraft were used for reconnaissance, for propaganda missions, for electronic warfare and deception operations, for support to Occupied Europe's resistance movements, and, as we have seen, for humanitarian aid and mercy missions towards the end of hostilities. Bomber Command was a true "Jack-of-all-trades," and it required the full resolution of its commanders not to become excessively and repeatedly diverted from its primary mandate by all the competing demands on its limited resources.³³

With the benefit of hindsight, while Arthur Harris was undoubtedly correct in his assessment of the need for a broad application of area bombing during the early innings of the campaign, his dogged rejection of the so-called "panacea targets" later on appears to have been somewhat myopic. Albert Speer and others dreaded timely follow-on efforts to the highly successful 1943 attacks on the Ruhr dams, Hamburg,³⁴ and the ball-bearing industry, and they believed that such a concentration of effort at the time would have been cataclysmic for the

Reich. Similarly, an earlier and more dedicated application of effort against the enemy's oil resources, which pitted the Commander-in-Chief Bomber Command against the Chief of the Air Staff, might have brought the European war to an earlier conclusion. But such is the fog of war, and Arthur Harris sincerely believed he was following the correct course and was utilizing his Command to inflict the most damage under the circumstances presented to him. And the course he chose, the targets he elected to pursue, perhaps at the cost of others more viable, were certainly not without merit or justification. Again, the wisdom of hindsight needs to be tempered with the perceptions of the day. Besides, Harris was firmly convinced from an early stage of the bombing campaign that frequent, concentrated repeat visits to specific targets would bring prohibitive losses to his Command.

The bombing offensive was also seen as a way to avoid the carnage of trench warfare, exemplified by the abattoir that the Western Front had become during the Great War. "For Britain, with its small population and the lack of a large standing army, a small force of specialized volunteers was arguably a more effective way of mobilizing British manpower than the development of a large and inexperienced ground army."³⁵ Also, all the great early airpower theorists of the pre-Second World War period, including Giulio Douhet, William "Billy" Mitchell and Sir Hugh Trenchard, had espoused the primacy of offensive air operations, the relative invulnerability of the bomber and the comparative fragility of civilian morale. The bomber offensive was very much in lockstep with Britain's overall peripheral strategy, which meant a war of long-term economic attrition and opportunism against the Germans, as opposed to a directly confrontational war of mass and concentration. The bomber offensive was, in fact, the epitome of unconventional, guerrilla warfare, and thus in keeping with Britain's overall strategic plan.

Furthermore, the Command made possible a combat initiative that was deemed vital, not just for the damage it would cause the Third Reich, but for the galvanizing of both British and global support. It certainly affected American and Commonwealth opinion, as well as that of potential allies and enslaved nations, telegraphing British resolve to forcefully press

home the fight against the tyranny of Nazism, alone if necessary. Its very prosecution assured Britain a pivotal say in the conduct of the war. It also did wonders for domestic morale, bolstering the British public in a time of great need for reassurance and hope. This evidence of commitment was never more important than after the German invasion of the Soviet Union during the summer of 1941. The bombing offensive constituted a second front, a significant source of relief to the beleaguered Soviets when no other offensive action was realistic or even possible. Later, bombing's contributions became a prerequisite to the successful invasion of northwest Europe; "an independent campaign to pave the way for a combined arms invasion of Hitler's Europe."³⁶ From April until September 1944, the majority of Bomber Command's activities were conducted in lockstep with the preparation, execution, and aftermath of the invasion through Normandy. And in the wake of this effort, the Command dealt decisive blows to the enemy's transportation and petroleum resources, effectively paralyzing the Third Reich in its final hours.

The total defeat of Germany's air force, through direct attacks on production facilities, airfield and support installations on the ground, and a highly successful war of attrition in the air, was a pivotal contribution to winning the war. Of the overall bombing offensive, Albert Speer, Hitler's Minister for Armaments and War Production, said: "As far as I can judge from the accounts I have read, no one has seen that this was the greatest lost battle on the Germans' side."³⁷

And what of the specific direct and indirect effects of the bombing? The latter were in ways much more damaging to the Axis war effort, and while engineers speak of a Law of Unforeseen Advantages, many of these indirect benefits were anticipated, if not deliberately orchestrated. The direct damage was also highly significant however.

Once air superiority had been attained over the Third Reich by the spring of 1944, the Allied air forces exploited this turn of events in a series of concentrated and systematic attacks against the German synthetic oil industry and transportation systems. The attacks on both these resources contributed significantly to the



Two views of the Vickers Wellington: **Right** – a 419 Squadron Wellington in flight; **Left** – the crew of a Canadian Wellington prepare for a mission in early 1945.

final collapse of the Reich. For example, German domestic oil production plummeted from 673,000 tons in January 1944 to 265,000 tons in September, and aviation fuel was temporarily reduced to 5 percent of needs.³⁸ Since nothing was more germane to the collapse of the German armed forces than the irrevocable defeat of its airpower, the effective grounding of the Luftwaffe was a knockout punch. The campaign against the synthetic petroleum plants, the refineries, and the oil fields was the most effective means of rendering the Luftwaffe impotent. The overall shortage of aviation gasoline adversely affected flying training from as early as 1942, with a concomitant serious degradation in the quality of personnel. The specific output of aviation fuel actually fell from 195,000 tons in May 1944, to 35,000 tons by mid-summer, and to a paltry 7,000 tons by September. Although stockpiled resources kept the Luftwaffe flying after a fashion throughout the summer, by autumn, shortages were acute. This had to be a bitter irony for Germany's air leaders, for it came at a time when the air industries achieved a new peak in fighter production, completing 3,133 aircraft in September alone. Along with making this production increase in conventional-type aircraft of little military significance, the additional limited availability of low-grade fuels, which could only be used in high-performance turbojet aircraft, was one reason that a jet force could not be fielded in time to become a significant, widespread threat to the Allies. As a broader, over-arching result, the Eighth, Ninth and Fifteenth Air Forces, working in concert with Bomber Command, destroyed virtually all of Germany's coke, ferroalloy and synthetic rubber industries, 95 percent of its fuel, hard coal and rubber capacity, 90 percent of its steel capacity,

75 percent of its truck producing capacity and 70 percent of its tire production.³⁹ And while various contemporary sources, including German accounts, state that Bomber Command's area bombing contributed between 20 percent and 31 percent of the direct aircraft production losses, and between 35 percent⁴⁰ and 55 percent⁴¹ of armoured vehicle production losses, many more losses were incurred while the Germans were attempting to distribute the finished products under near-continuous heavy air attacks. At any rate, the point is moot. Without fuel to convey the aircraft aloft or to get the tanks into battle, they were useless.⁴²

The loss of oil production was also felt in many other ways. In August 1944, the final run-in time for aircraft engines was cut from 2 hours to a half hour. For lack of fuel, pilot training, previously cut down, was further curtailed. Through the summer, the movement of German Panzer divisions in the field was hampered more and more seriously as a result of losses in combat and mounting transportation difficulties, together with the fall in fuel production. By December, according to Speer, the fuel shortage had reached catastrophic proportions. When the Germans launched their desperate counteroffensive on December 16, 1944, their reserves of fuel were far from sufficient to support the operation. They counted on capturing Allied stocks. Failing in this, many Panzer units were lost when they ran out of gasoline.⁴³

At this juncture of the war, Arthur Harris may have exercised faulty judgement in not mounting a more enthusiastic and focused campaign against the oil resources, since he still put considerable emphasis on the bombing of the industrial cities. The counter-oil campaign was decisive, though arguably prolonged by a

concentration on other interests. However, a number of industrial cities hit by Bomber Command during this phase included significant damage to oil and related targets. The results were on occasion significantly more successful than the USAAF's daylight bombing, thanks to a high degree of experience and accuracy with the blind-bombing aids Oboe and H2S, the Air Position Indicator (API), the Group Position Indicator (GPI) and the improved Mark XIV gyro stabilized automatic bombsight (SABS). The blow dealt was decisive; it just may have taken longer to deliver because of the conflicting priorities. Albert Speer concedes:

The systematic air raids of the fall of 1944 once again throttled traffic and made transportation, this time for good, the greatest bottleneck in our war economy.⁴⁴

Prior to the war, Germany possessed a world-class railway system that was very capable and well maintained, and it was complemented by an equally formidable inland waterway system for the movement of bulk material to and from the industrialized Ruhr. However, the railroad system became increasingly overburdened through the industrial dispersion necessitated by the bombing, and this dispersion required

the construction of considerably more railroad infrastructure, which was highly susceptible to concentrated air attacks. While the German transportation system did not become a priority target until very late in the war, "the effects of the heavy air attacks beginning in September of 1944 were felt at once and were clearly apparent in the general traffic and operating statistics of the *Reichsbahn*...the heavy attacks of September and October produced a most serious disruption in railway operations over the whole of western Germany."⁴⁵ Concurrently, successful attacks on waterway targets devastated industrial traffic on the Rhine and the north German canals, causing the vital Ruhr district to suffer heavy declines in transport. For example, the Dortmund-Ems Canal, from October 1944 until March 1945, could average only 12 percent of the shipping attained during the previous year.⁴⁶ The supply of critical components to virtually all vital war production elements was severely impacted by the concentrated attacks of September and October, and reserves were virtually exhausted by November and early December. Most dramatic was the near-total curtailment of hard coal supplies to the Ruhr. "The consequences of the breakdown in the transportation system were probably greater than any other single factor in

Air attacks had a devastating impact on the transportation system throughout Germany and occupied Europe. This photo shows the results of a bombing raid on the railway marshalling yards in Meziidon, France.



LCMSDS Photograph Collection

the final collapse of the German economy...most of the chaos which gripped the German economy was traceable directly or indirectly to the disaster which overtook the transportation system."⁴⁷ The loss of transportation infrastructure stymied the flow of basic raw materials, components and semi-finished products, and also severely limited the distribution of finished products.

It is true that large-scale priority attacks on the transportation system came too late in the war to seriously affect the German armed forces at the fighting fronts. "By the end of the war, however, it had so paralyzed the German industrial economy as to render all further war production virtually impossible. It had, moreover, removed the foundation of the civilian economy, suggesting the inevitability of eventual collapse under continued air attack."⁴⁸

The Indirect Effects of the Bombing Campaign

Throughout Germany in 1944 alone, approximately 800,000 workers were engaged in essential repair work solely attributable to the bombing, especially to factories and to modes of communication. An additional 250,000 to 400,000 personnel were required to provide the necessary equipment, resources, and services to effect the repairs. Thus, a tremendous amount of the available manpower was diverted from other essential employment to the reconstruction effort.⁴⁹ Furthermore, industrial reconstruction itself was often subjected to push-pull meddling from the highest levels, breeding further manpower wastage. Albert Speer noted that Hitler himself was very shaken by the destruction of valuable historic buildings, particularly theatres. "Consequently, he was likely to demand that burned-out theaters be rebuilt immediately. Several times I tried to remind him of other strains on the construction industry."⁵⁰

The bombing of the industrial cities forced a policy of decentralized production, or dispersal, and this placed additional burdens and vulnerability on the transportation and communication networks. As well, it diverted resources from new construction efforts. Dispersal was highly disruptive to industrial firms that had been centralized to operate at

maximum efficiency. Dispersal also demanded a greater diffusion of and reliance on a very limited pool of skilled labour, and led to a sharp decline in the quality of weapons produced. Supervisory shortages also resulted in significantly more industrial sabotage from an increasingly unwilling, press-ganged and slave labour force. Decentralization denied the Germans the ability to operate a rational, efficient, highly centralized industrial war effort, which would have permitted much higher levels of output.⁵¹ In the aircraft industry alone:

Existing production schedules were disrupted and dilution of management supervision made itself felt. In the end, it increased the load on its overburdened transportation system and, when attack was concentrated on transportation, the final assembly plants lacked the necessary sub-assemblies and components. The policy of dispersal was then revised in favour of concentration underground, but it was too late.⁵²

The frenzied production pace, aided by the bombing, led to significant decreases in quality control and greatly reduced worker productivity. Shortages of skilled labour and strategic materials, production interruptions, plant damage, slipshod construction, and even sabotage all led to declines in end-product quality. Nowhere was this more evident than in the aircraft engine industry, where the increasingly unreliable powerplants generated major problems in morale for the *Luftwaffe*, especially among the inexperienced fighter pilot cadre.

Yet the night bombing campaign's greatest contribution to the winning of the war was precisely what Harris claimed and the conventional wisdom has so often discounted. The "area" bombing attacks did have a direct and palpable effect on the morale of the German population, and the German leadership, in response to that impact, seriously skewed Germany's strategy. Recent scholarship in the Federal Republic indicates that as early as the summer of 1942, the night bombing campaign was affecting German attitudes. In 1943, the heavy bombing caused a dramatic fall off in popular morale.⁵³

As the foregoing words of American military historian Williamson Murray attest, the bombing's impact on enemy morale was significant. However, it was unrealistic to expect that in an extreme police state such as the Third Reich, a popular uprising and overthrow of the

Nazi regime would ensue. Still, the cumulative effects of the bombing, especially the bombing by night, were intensely demoralizing. And once the Allies had designated the ruin of enemy morale, particularly that of the industrial work force, as an overt war aim, regular intelligence reports reinforced the views of senior Allied commanders that this war aim was being fulfilled. In fact, as early as the summer of 1940, British intelligence sources in neutral Switzerland reported the impact of the still-minimal bombing on enemy morale as follows: "A Swiss recently returned from Germany states there is some labour unrest in the Ruhr owing to the fact that workers are doing 12 hour shifts a day and fail to get a proper night's rest owing to aerial attacks."⁵⁴

One of the most effective of an early series of Bomber Command raids, and one frequently underestimated in significance, was the bombing of Berlin on the night of 4/5 September 1940. While the damage was not extensive, the raids generated considerable public resentment. Adolf Hitler was goaded into switching his bombing priorities to a retaliatory campaign against London, just when the campaign against Fighter Command's airfields and command and control facilities was proving decisive. There is little doubt that this emotional decision by Hitler, soon echoed by Göring, ensured the survival of both Fighter Command and the British nation at their moment of greatest vulnerability. Furthermore, the following previously classified high-level British and Allied documents from 1942 provide substantiating evidence for continuing the bombing campaign against enemy morale. These observations were undoubtedly contributing factors in the evolution of the bombing policy. A letter from Paymaster General Lord Cherwell to Prime Minister Churchill of 30 March 1942 states:

Investigation seems to show that having one's house demolished is most damaging to morale. People seem to mind it more than having their friends or relatives killed.⁵⁵

Similar sentiments are expressed in these excerpts from Mr. Justice John E. Singleton's "Report to the War Cabinet on the Bombing of Germany," dated 20 May 1942:

Another feature to which reference should be made is the recent German propaganda, which

appears to show the anxiety felt in Germany on our air raids on that country...Now we expect to be able to deliver to Germany in the future a much greater weight of bombs than we received. If we can combine with this a greater measure of accuracy and intensified concentration, I feel it will have a very considerable effect, growing as the intensity of the bombing increases, and the more so if there does not appear to the German people any likelihood of their air force being able to deal with the forces of those opposed to them...Its effect on the German people will be much greater if the projected attack on Russia fails...It is right to say that among the things which are important from the point of view of morale of the people are housing, warmth, sleep and food...The first sign of the effect (of sustained bombing) may well appear in the German troops if they realize that those they have left at home cannot be protected from air attack, as was promised to them...I think there is every reason to hope for good results from a sustained bombing policy.⁵⁶

And a missive a month later, on 22 June, from the US Consul General in Geneva through Bern to the US Secretary of State elaborates:

There is reason to believe that high German military circles are fearful of the effect of a mass bombing designed to panic the civilian inhabitants of thickly populated districts into frenzied activity.⁵⁷

The highly influential intelligence reports of late 1942 also appeared to validate the area bombing strategy against the industrial cities, just prior to the pivotal policy decisions that would be made at Casablanca early the following year. British Intelligence Report No.346, 22 September 1942 notes:

Unrest; Stories Spread by Evacuees

Unrest in the bombed areas is great and in those districts to which the homeless and children from "air threatened regions" have been evacuated, a certain nervousness is already noticeable, because the evacuees naturally talk about their experiences.

Destruction of Factories and Food Depots

These big raids cause much destruction. In spite of the statements in the Wehrmacht reports, the destruction of war production facilities is fairly considerable. The loss caused by the destruction of food stores and depots is extraordinarily great, as the food cannot be replaced.⁵⁸

The following is a British Intelligence "Report on Bombing's Effect on Housing and Division of Effort," from autumn 1942:

The loss of one's home and possessions has been found in this country (Germany) to be one of the most important points with regard to morale. Judging by the strict measures enforced on information of the results of our raids reaching the soldiers at the front, it would appear that the German authorities are aware of the effect it may also produce on the morale of the fighting services.⁵⁹

And finally an excerpt from "An Estimate of the Effects of an Anglo-American Offensive Against Germany by the Chiefs of Staff Committee for the War Cabinet, 3 November 1942."

Conditions at Karlsruhe, as compared with Coventry and Lübeck, thus afford a striking illustration of the cumulative effects on organization and morale which have followed raiding, even on the relatively small scale we have achieved in the past few months. The change in outlook which has taken place is perhaps best shown by the pronouncements of Robert Wagner, the local Gauleiter. These emphasize that during air raids the individual must look after himself as best he can, and after that he must be prepared to do his own repairs without calling on the authorities to help him. Such instructions would be at least tolerable under a democratic system which expects the citizen in emergency to be capable of personal effort and initiative. They accord very badly with the accepted principles of Nazi centralized Government, and the admitted breakdown at this early stage of the State organization in which the Germans have been so carefully taught to place implicit faith is a significant indication of the effects which large-scale bombing may be expected to produce.⁶⁰

The foregoing reports bolstered the wartime belief of the Allied commanders that the bombing campaign against enemy morale was viable and worthwhile. Therefore, although specific industrial and military targets were pin-pointed, it was broadly anticipated that not merely industrial materiel damage would occur, particularly because of the German propensity for embedding industrial facilities in residential areas. As historian Denis Richards has written: "With their homes, work places and neighbourhood amenities all destroyed, on top of all the privations they were thought to be suffering, the German people were expected to lose all their zeal, not only for production, but also for the Nazi regime."⁶¹

The Moral Issue

However, it must be clearly understood that no part of this policy deliberately mandated the slaughter of civilians, although heavy civilian casualties would be an inevitable result. Rather, the intention was to make it exceptionally difficult, if not impossible, for the enemy civilian work force to remain on the job. "It was hoped to break their will to do so by destroying their houses and all the comforts and necessities of a civilized urban life. If the civilians fled to the countryside, or the authorities managed to evacuate them from the major towns—as British mothers and children had been evacuated during the early days of the war—so much the better: the industrial desert (the primary goal) could be created with less loss of life."⁶²

However, after the Battle of Britain, throughout that joyless winter of 1940–1941, the Germans adopted a broader night bombing campaign against the British industrial centres as a means of weakening resistance and disrupting the production and supply of war materials. In addition to London, Liverpool, Hull, Portsmouth, Coventry, and many other cities, including the east coast ports, were singled out for special attention, culminating in the Baedeker Raids of early 1942. From this point onwards, British authority no longer felt obliged to exercise due care and restraint with respect to minimizing collateral civilian casualties in the German industrial centres. Furthermore, this policy direction enjoyed widespread public support at the time.

Richard Overy believes the Allied bombing was severely disruptive to German society. Throughout the war, nearly nine million citizens were evacuated from the German cities, which not only dramatically reduced the potential work force, but also placed incredible strains on infrastructure to provide shelter, nourishment, and other essential consumer goods to all those displaced persons, further diverting resources from the war industries. Worker efficiency in areas directly threatened by the bombing suffered considerably; long, exhausting hours were spent in cramped air raid shelters or cellars. Absenteeism increased, and by 1944, it averaged almost four full working weeks per worker annually in the Reich. For example, at

the Ford works in Cologne on any given day in 1944, at least one-quarter of the work force was absent. When the numbers documenting the unparalleled levels of productivity of German industry during 1944 are examined, one has to wonder what they would have been had the Germans not been faced with a near-constant threat of death from the air. Much of the production was generated by slave labourers who worked in atrocious conditions. This work force was never more than two-thirds as productive as free German workers, nor were they motivated to improvement beyond the spur of terror. Along with vast suffering, the bombing placed a definite ceiling on German productivity, even in a state of total war.

A significant amount of the increased late war industrial output is explained by the fact that Germany was deliberately working nowhere close to full war capacity for the first three years of the Second World War. When Albert Speer took the helm as Armaments and War Production Minister in February 1942, the nation was only producing three percent more of these products than in peacetime, and Adolf Hitler was adamant that the military endeavours of the Third Reich would not interfere with the consumer industries. Hitler expected a Blitzkrieg win in the Soviet Union, and he launched this precursor to what would eventually become total war on the foundation of a peacetime economic and industrial output. Until 1943, German industry was generally only working one ten-hour shift each day. Thereafter, policy changed to accommodate three shifts and a seven-day, twenty-four-hour operation, augmented by an involuntary work force of 2,500,000 prisoners and 1,500,000 workers press-ganged in from the occupied territories.⁶³

As the bombing intensified, there were profound political ramifications to Speer's industrial policies. Hitler and his entourage lost confidence in Speer and began to blame him for all the nation's economic ills. Himmler became increasingly involved in economic matters and began running Speer's system at gunpoint, which in turn dissuaded many Germans.⁶⁴

Bombing appreciably affected the German will to resist. Its main psychological effects were defeatism, fear, hopelessness, fatalism and apathy. It did little to stiffen resistance through the arousing of aggressive emotions of hate and

anger. War weariness, willingness to surrender, loss of hope in a German victory, distrust of leaders, feelings of disunity, and demoralizing fear were all more common among bombed than among un-bombed people...The disruption of public utilities in a community did much to lower the will to resist. Especially significant was the disruption of transportation service; it was the most critical public utility for the morale of the civilian population. Electricity was next in importance among the utilities, then water, then gas. A vital blow to the morale of a bombed community was the destruction of school and recreational facilities for children. This necessitated the evacuation of school children. Parents were doubly affected by such evacuation because they suffered not only the burden of family separation but also the possible loss of the moral guidance of their children to the Nazi Party.⁶⁵

The Effect on German Morale

The highest German authorities were very concerned with home front morale throughout the bombing campaign. Albert Speer paraphrased Hitler on 8 March 1943 as follows: "Hitler repeatedly explained that if the bombings went on, not only would the cities be destroyed, but the morale of the people would crack irreparably."⁶⁶ To maintain a feel for the pulse of the nation's morale, German authorities fielded an extensive intelligence service, and the Official Morale Reports this service provided demonstrate that "in official German eyes the air war was of crucial importance in the struggle for popular support of the Nazi regime...These accounts consistently assert that air attacks were undermining morale and producing defeatism."⁶⁷

Propaganda, a keystone of the Third Reich, was used as a means of stimulating morale and it permeated everything in German day-to-day life. However, "bombing had much to do with the final discrediting of propaganda, because it brought home to millions of Germans the tangible proof of Allied air power—indisputable proof completely at odds with the familiar Nazi propaganda." Surveys done after the war indicate that only 21 percent of the Reich's citizens regarded German information provided during the war as reliable, while 54 percent regarded it as being "completely unreliable."⁶⁸

It is perhaps appropriate that Germany's pre-eminent conjuror of public opinion, Joseph Goebbels, should have the final word on the

Photo courtesy of David L. Bashow.



The de Havilland Mosquito was a very capable and flexible aircraft which contributed to a rich and varied operational life. Here, a bomber variant of the Mosquito is serviced prior to its next mission.

impact of the bombing on German morale. These brief excerpts from his “twelfth-hour” personal diaries belie the public vitriolic pronouncements on the bombing woven throughout the war by the German Propaganda Ministry:

12 March 1945

The air terror which wages uninterruptedly over German home territories make people thoroughly despondent. One feels so impotent against it that no-one can now see a way out of the dilemma. The total paralysis of transport in West Germany also contributes to the mood of increasing pessimism among the German people.

15 March 1945

Not only our military reverses but also the severe drop in the German people’s morale, neither of which can now be overlooked, are primarily due to the unrestricted enemy air superiority.

31 March 1945

The political attitude of the people west of the Rhine was very bad. They had been demoralized by the continuous enemy air raids and are now throwing themselves into the arms of the Anglo-Americans, in some cases enthusiastically, in others at least without genuine resistance.⁶⁹

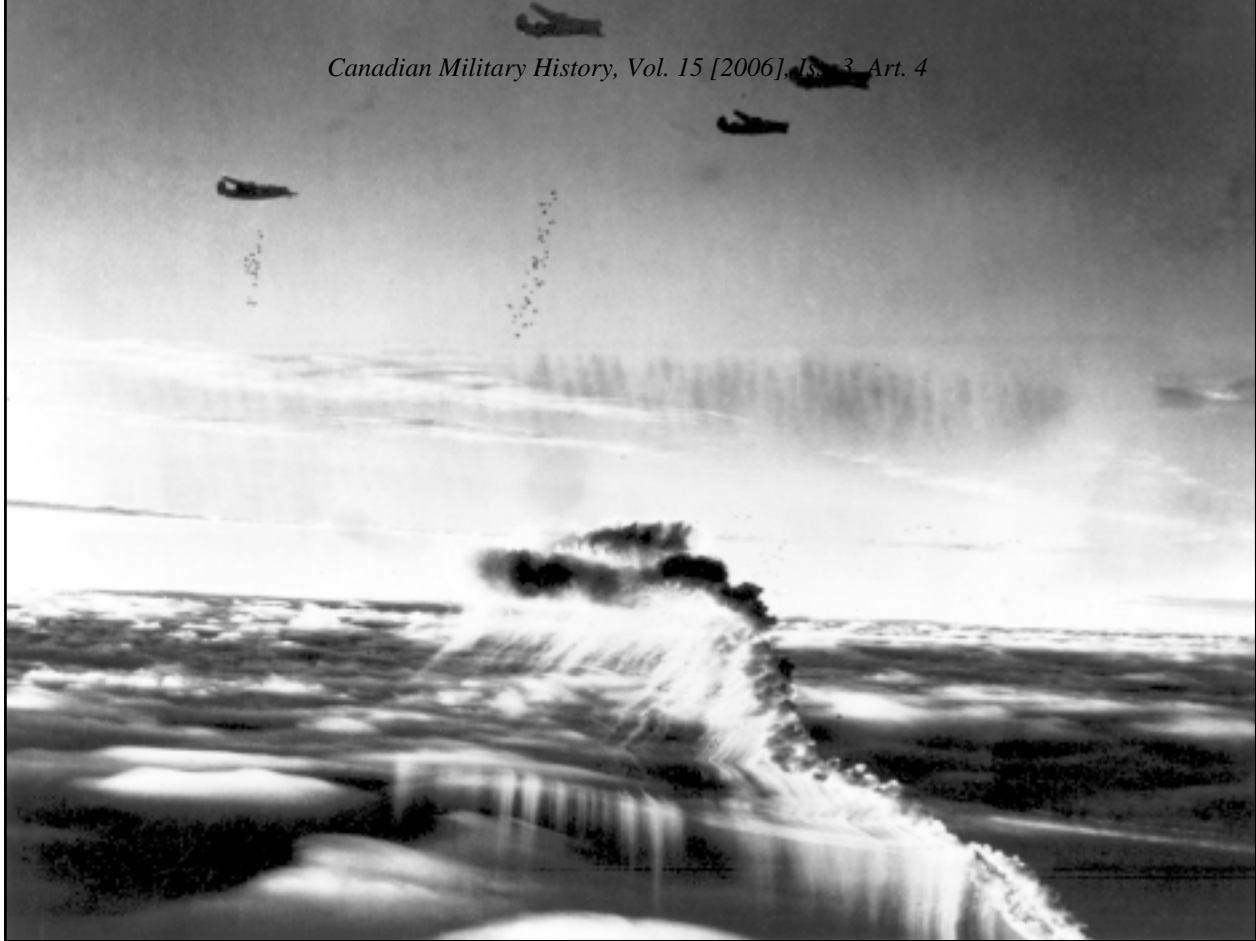
This lack of resistance in the German urban areas at the end of hostilities undoubtedly hastened the German surrender, and, based on previous experiences, saved many late-war casualties on both sides by avoiding difficult and bitter house-to-house fighting.

A real importance of the air war consisted in the fact that it opened a Second Front long before the invasion of Europe. That front was the skies

over Germany. The unpredictability of the attacks made the front gigantic. Every square metre of territory we controlled was a kind of front line and because the attacks were both by day and night, it required a 24 hour state of continuous readiness.⁷⁰

In recent years, a number of eminent German historians and political scientists have reversed a widespread and popular German stance that the area bombing was ineffective. Horst Boog, who was until relatively recently Chief Historian of the German Office of Military History, spoke at a Symposium on the Strategic Bomber Offensive, held at the RAF Staff College at Bracknell in the United Kingdom in March 1993, and undertook to dispel two persistent myths concerning area bombing and German civilian morale:

He said: “Let me give you some recent views about the...bombing. The judgement that the British area attacks were ineffective can no longer be supported. For a proper assessment we have to look at indirect effects. Had there been no bomber offensive things in Russia might have developed differently.” He also notes that over a million men were now on the AA guns. They would have served their country’s war effort better in Russia, or in factories. Doctor Boog also dispels the myth of continued high morale under bombing. He defines morale as, “The will to continue to work for the war effort.” But he makes the point that the people were prisoners of the Nazi regime. “Their political surveillance system meant doing what one was told and not shirking in the presence of others...morale was certainly weakened, as recent studies have revealed, and especially in cities suffering heavy attacks.”⁷¹



US Air Force Photo

Consolidated B-24 Liberators of the US 8th Air Force attack a target on the French coast during the Normandy campaign. Sky markers (irregular smoke patterns visible at the bottom of the photo) provide an aiming point for the bombardiers above a target covered in cloud.

German historian Götz Bergander has drawn a significant distinction between private morale and war morale in the Third Reich. Bergander maintains the former was never broken, because this constituted the will to live, “based on personal, family and vocational aspirations and generating inventiveness, stubbornness and the desire to assert oneself. The latter, reflected in people’s ability to think about future prospects, was on the other hand severely damaged—much more than first thought.”⁷²

In reality, the air raids on cities and industry shook the foundations of the war morale of the German people. They permanently shattered their nerves, undermined their health and shook their belief in victory, thus altering their consciousness. They spread fear, dismay and hopelessness. This was an important and intentional result of the strategic air war, of this warfare revolution.⁷³

Forced Diversions of Enemy Economic Effort

Very little credit has been given for the copious amounts of personnel and equipment that

remained tied down in Germany in defence of the industrial cities, nor to those personnel required to repair the damage done by the bombing. Speer acknowledges that many new and promising battlefield technological improvements had to be shelved in order to produce additional anti-aircraft weaponry, and that half of the electronics industry was engaged in producing radar and communications equipment for the defence of the Reich. A third of the precision optics industry was required to produce gun sights for the flak batteries, which frequently left German field forces critically short of their own optical needs.⁷⁴ *Reichsmarschall* Hermann Göring positioned nearly 9,000 of the formidable and versatile 88 mm flak guns within the Fatherland, guns and operators which could have doubled the German defences against Soviet tanks on the *Ostfront*. By 1944, there were 14,489 heavy flak guns deployed in the west, while a further 41,937 light guns were similarly deployed to augment the heavier weapons.⁷⁵ Anti-aircraft shells consumed one-fifth of all ammunition produced. *Feldmarschall* Erhard Milch, the Quartermaster-General of the *Luftwaffe*, said that within the Reich, nearly 900,000 men, along with some women and

children, were employed in the anti-aircraft forces alone by 1944.⁷⁶ In aircraft operations, from September 1942 until January 1943, the *Luftwaffe* was tasked to keep the beleaguered German garrison at Stalingrad supplied and to provide combat air support against a tightening Soviet noose. However, the need to honour the bomber offensive in the West, along with other *Luftwaffe* commitments and the renaissance of the Soviet Air Forces made this an impossible task. The resultant loss of the entire German 6th Army in February 1943 was therefore at least partially attributable to Bomber Command's efforts to that point of the war. By January 1944, 68 percent of the day and night fighter forces were dedicated to facing the Anglo-American bomber threat, leaving only 17 percent of these forces for the Eastern Front after other needs were accommodated. By October 1944, the percentage of fighter aircraft retained in the Reich would balloon to 81 percent.⁷⁷

These formidable apportionments slowly but inexorably starved the German field armies of essential air support. By 1944, German bomber aircraft accounted for only one-fifth of all aircraft production, because of the overriding need for fighters at that stage of the war.⁷⁸ Thus, without the Allied bombing, German forces at the fighting fronts would have had much greater aerial support and protection, and Allied forces on all fronts would have been much more exposed to German aerial bombardment.

A significant number of unpredictable diversions of effort were produced by the bombing, although German war policy itself is as much to blame for the ultimate success of the bomber offensive. When *Generaloberst* Wever, the *Luftwaffe's* first Chief of Staff, died in 1936, Germany lost its most fervent advocate of the need for its own long-range strategic bomber fleet. Instead, the country geared its bomber production to medium and short-range types to be used in conjunction with land forces employing dynamic, short-term *Blitzkrieg* tactics. A truly strategic, independent bombing force would have made all the industrial targets within the United Kingdom accessible by air, as well as the vulnerable Soviet power stations and industrial complexes, the majority of which had been relocated to the east of the Ural Mountains by 1943. It would also have posed a significant long-range threat to Allied shipping convoys in

the North Atlantic. However, lack of extended planning, underestimation of enemy capabilities, and conflicting war priorities brought about by different needs for different war theatres all played a part in delaying the development and production of a viable long-range strategic bomber until Allied bombing had forced fighter priorities on German aircraft production. Bureaucratic ineptitude, high-level bickering, sycophantic pandering to the frequently contradictory, meddlesome, unrealistic, and inappropriate war guidance of Adolf Hitler himself, as well as an extreme shortage of strategic materials, stymied this direction of effort.

From 1944 onwards, Germany was devoting the bulk of its aircraft production to day and night fighters, largely of obsolete models and technologies, for the defence of the Reich. The strategic and administrative decisions that were made in 1940 and 1941, and even earlier, with respect to bomber fleets and air tactics effectively sealed Germany's fate and guaranteed a permanent air inferiority for the rest of the Second World War. German air strategy, rather than being proactive and unpredictable, became reactive and almost totally predictable, in no small measure because of the Allied bombing.⁷⁹

Approximately 70,000⁸⁰ aircrew members of the *Luftwaffe* were either killed or reported missing during the Second World War, and while they destroyed roughly 70,000 enemy aircraft on all fronts, they lost between 62,500 and 100,000 of their own machines in the process.⁸¹ Many of the losses were fighter aircraft and fighter pilots, waging a hopeless battle of attrition, the majority of them in defence of the homeland. From the British camp, of the 8,655 Bomber Command aircraft that went down over the Reich, Italy and Occupied Europe, approximately 6,000 were attributable to air-to-air combat during the bombing offensive.⁸² Nearly 1,800⁸³ *Luftwaffe* night fighter aircrew, a very small portion of the larger *Luftwaffe* fatal casualty total, lost their lives during these predominately nocturnal engagements.⁸⁴

Provocation of an Axis Response

One of the most significant effects of the bombing was that it goaded Hitler into



The Germans expected their secret V-weapons to change the course of the war. Instead, attacks by Allied bombers effectively blunted the potential impact of these weapons. **Above left:** This image from a captured German newsreel film shows an early test launch of V2 rocket. **Above right:** This completely intact V1 Flying Bomb was captured by the Americans in November 1944 after it made a “perfect” crash landing in France and did not explode. It was subsequently dismantled and taken to the United States for study.

striking back in a wasteful and inefficient retaliation campaign, embodied in the V-weapons program. This massive industrial diversion consumed the equivalent of 24,000 more fighter aircraft for the *Luftwaffe*, and neither weapon proved decisive. Also, the program squandered the nation’s technical capacities, for it meant that much more promising technologies, such as the Me 262 jet fighter, the Type XXI and Type XXIII U-boats, new acoustic torpedoes and the surface-to-air *Wasserfall* missile had to be given much less priority in terms of both intellectual and material commitment.⁸⁵ In the words of Albert Speer, from the end of July 1943 onward, “our tremendous industrial capacity was diverted to the huge missile known as the V 2...the whole notion was absurd.”⁸⁶ Furthermore, the 1944 campaign against the V 1 launch sites, coupled with the earlier and costly Bomber Command raids on the rocket development centre at Peenemünde on 17/18 August 1943, and in October on the V 1 manufacturing site at Kassel, effectively blunted the limited impact of these weapons. Had they been available in quantity on D-Day, the effects of the bombs raining down on the embarkation ports and the massed invasion fleet could have been catastrophic for the Allies. The Me 262 could potentially have been a war-winner for the Germans. However, it was slightly

delayed in its service debut by Hitler’s insistence that it be produced as one of the retaliation weapons, namely as a Blitz bomber, before it was belatedly approved for production as a fighter during the winter of 1944. More serious was the delay, necessitated by the pursuit of other priorities at least partially generated by the bombings, in addressing the technological shortcomings of the jet’s powerplants. Had the aircraft been mass produced as a fighter even six months earlier, its impact on Allied bomber formations could have been cataclysmic. In short, the bombing campaign generated unforeseen technological responses conducted at breakneck pace, and helped encourage the German executive branch towards desperate solutions forged by passionate aims of retribution, versus cold, methodical, and logical actions.

Some Sinister Threats Contained

Had Germany not been so diverted by the bombings and been free to mobilize its manpower and technological resources in a total war environment, chemical, biological and even atomic weapons might well have been in store for the Allies. And based on the Nazi track

record, although the use of these weapons was certainly somewhat moderated by fear of reprisals in kind, there is considerable evidence to suggest that the German authorities had no scruples about employing them in acts of desperation, had they been widely available and deliverable. The Germans were not particularly focused on atomic weapons after the autumn of 1942, although their development remained a continuous worry for the Allies. As to whether Hitler would have had any moral reluctance to use them, Albert Speer's words are interesting: "I am sure that Hitler would not have hesitated for a moment to employ atom bombs against England."⁸⁷ And how, in Speer's opinion, did the bombing affect the pursuit of a focused German atomic program? "The increasing air raids had long since created an armaments emergency in Germany which ruled out any such ambitious enterprise. At best, with extreme concentration of all our resources, we could have had a German bomb by 1947."⁸⁸ Specifically, the wholesale evacuation of much of the Kaiser Wilhelm Institute for Physics research facility's infrastructure from the Dahlem suburb of Berlin

to Haigerloch in the Black Forest, in response to intimidation generated by the Berlin air raids, undoubtedly forced considerable delays and confusion on the German atomic program and disrupted its focus.⁸⁹

Furthermore, the curtailment of the V 2 program in the spring of 1945 was perhaps a more fortuitous event than is broadly realized for the Allies. Specifications were already under development for an advanced version of the rocket known as the A 10, which used the V 2 as a second stage booster, and it would have had a trans-Atlantic reach. Had Germany been able to put together an atomic weapon program to meld with this delivery capability, the results could have been cataclysmic. However, the bombings, the persecution of significant Jewish scientific talent, the widespread multiplicity of duplicating research programs, all of which were competing for Hitler's favour instead of working together, collectively conspired to stagnate German atomic weapons development. The Germans had failed to separate U 235, the essential fissile element, on a large scale by August 1944, even though

A Canadian soldier looks into the crater caused by the impact of a V2 rocket. Fort de Merxim, Belgium, 15 October 1944.



Library and Archives Canada PA 136322



Beaverbrook Collection of War Art, Canadian War Museum AN 19710261-5169

Marshalling of the Lancasters Against Stuttgart – Carl Schaefer

they had by then succeeded in manufacturing uranium oxide, a core material for atomic weapons. Still, in the view of the Alsos Team of Allied atomic specialists that thoroughly ransacked Germany, both before and after VE Day, the Germans were years away from producing an atomic weapon at the same time the Allies were nearing successful completion of their own.⁹⁰

With respect to biological warfare, recent research has determined that Germany was ready to deploy a foot-and-mouth virus against Britain during the final months of the war. Successful tests were conducted over Russian terrain against reindeer in 1943, but there was no guarantee that lagging German bomber and delivery system capabilities, hampered by the concentration on fighter development necessitated by the bombing, were able to accurately dispense the material.⁹¹ The dispersal of chemical agents faced similar constraints. The deadliest nerve gas of the day, Tabun, was manufactured in quantity at Dyhernfurth on the Oder River late in the war. Considered ten times more lethal than Phosgene, which was, until then, rated the most lethal war gas, 15,000 tons of Tabun were produced before the Soviets overran the production facility in 1945. However, all the finished products had been fitted into

different host munitions and removed from the production facility prior to Soviet occupation. At war's end, nearly a half-million artillery shells and more than 100,000 aircraft bombs filled with Tabun were found in German arsenals, but they became available too late to orchestrate a delivery campaign, and they were subsequently destroyed by the western Allies. Other German nerve gas agents were called Sarin and Soman. Sarin, far more lethal than Tabun, proved to be exceptionally difficult to manufacture. Competing priorities and technological problems associated with its delivery delayed the emergence of Sarin, although over 7,000 tons of it had been stockpiled by the end of the war. However, had the time, the will, and the wherewithal remained to effectively field it, the Sarin stockpile would have been enough to kill all the occupants of at least 30 cities the size of Paris. Soman, an even more potent agent, was never developed beyond the laboratory.⁹²

The Mining Campaign Pays Huge Dividends

Other Bomber Command “diversions” contributed significantly to the war effort. The mining campaign effectively denied the use of the western Baltic to the Germans for transit

and training and curtailed trade in the region. Late in the war, the influence of *Grossadmiral* Karl Dönitz on Hitler was significant, particularly after Hermann Göring had fallen into disfavour. Bomber Command had been very successful in mining the shallow waters of the western Baltic, which then made retention of the eastern Baltic of paramount importance to the *Kriegsmarine*. However, the eastern Baltic was more difficult for bombers to reach and the deeper waters made mines less effective. In order to retain sea control of the region, Dönitz maintained that the Germans needed to hold the Courland Pocket in western Latvia, and also the Gulf of Danzig, Memel, and East Prussia. Hitler agreed completely with Dönitz's assessment and concurred that loss of the region would paralyze the *Kriegsmarine*, particularly its U-boat operations. In a late-war conference, however, *Generaloberst* Heinz Guderian proposed that the forces in Courland, Memel, and East Prussia be evacuated in order to provide troops to counter the impending Red Army spring offensive. Nonetheless, based on the influence of Dönitz, Hitler vetoed Guderian's proposal, and this effectively tied down 40 German divisions, or a third of the forces available to fight the approaching Red Army. Furthermore, these tied-down forces contributed virtually nothing to the final defence of the German homeland, and protection of U-boat operations in the eastern Baltic was also by then a moot point. In the words of the Australian journalist and historian, Chester Wilmot:

The history of the Second World War affords no more striking example of the interplay of naval, air and land power, or of the interrelation of the Eastern and Western Front or, for that matter, of the grotesque miscalculations and wild hopes that governed Hitler's strategy. Because the German Air Force was unable to protect the U-Boat bases and training waters in the western Baltic, the German Army was obliged to hold the eastern Baltic against the Russians so that the German Navy might build up a new U-Boat fleet capable of inflicting a severe defeat on the Western Allies, and especially on the hated British, whose refusal to capitulate in 1940 had made inevitable that war on two fronts, which had already destroyed most of Hitler's empire and was in the process of destroying the Third Reich.⁹³

No Respite for the U-boats

To demonstrate the direct effects of the bombing war against the *Kriegsmarine*, Harris pointed out that Bomber Command destroyed six German capital ships by either bombing or mining, in comparison to only four sunk during the entire war by the Royal Navy. Furthermore, Bomber Command's Official History recorded that the Command, working in conjunction with the American heavy bomber fleet, destroyed at least 207 German submarines during construction or in port after completion.⁹⁴ At the end of 1943, Dönitz held forth the promise of a reincarnated, invincible *Kriegsmarine*, spearheaded by a fleet of formidable new U-boats. These submarines, which incorporated many technological improvements to enhance survivability and combat effectiveness, were scheduled for initial delivery in the autumn of 1944. Ultra-high-speed radio transmitters, more sophisticated acoustic torpedoes, rubber coated hulls to complicate radar detection, as well as *sch snorkel* underwater breathing devices and significant augmentation of the onboard batteries to allow the boats to remain submerged for protracted periods of time, were just some of the improvements incorporated into these formidable new weapons. However, other industrial diversions, brought on in no small measure by the bombings, had delayed production of the new boats. "First Brest, then Lorient saw the start of a long series of bombing raids which also greatly affected the civilian population, and the Germans soon realized the need to build shelters for personnel and equipment. To effectively protect the submarines themselves, it was necessary to produce solid bunkers . . . The accelerated construction of the U-boat pens at Hamburg was a direct result of the bombing of the sheltered U-boat bases in France."⁹⁵

Partially as a result of this enormous diversion of economic effort, production of the new variants was not given a high priority until the spring of 1943, by which time the Battle of the Atlantic was effectively lost. The blue-water Type XXI and its much smaller coastal-operating cousin, the Type XXIII, could perhaps have made a difference had they been floated two years earlier. They were capable of formidable underwater ranges, and their performance characteristics were outstanding. They promised

much better prospects for attacking Allied shipping and evading the escorts than did the conventional U-boats. Both required only a minimal daily time at *schnorkel* depth to keep their batteries charged, thus making detection extremely difficult. But the spectre of bombing vulnerability had perpetuated a decision in the summer of 1943 to build these submarines in inland factories in modules,⁹⁶ then transport them to coastal facilities for rapid final assembly. However, improper fitment between the modules created production delays, and transportation of the modules to the final assembly points was also affected by the bombing.

The failure to achieve the objectives was mainly caused by organization troubles, faulty design and bad workmanship. It was particularly annoying when sections did not fit to each other because the specified tolerances were exceeded. All these took place mainly in the first half of 1944 and it was fixed in the second half of the year. At that time, however, the Allies realized the danger and started regular bombing raids, particularly on shipyards and water transport installations needed for transportation of massive Type XXI sections.⁹⁷

Direct bombing delayed construction even further, such that only two Type XXIs and six Type XXIIIs were fully ready for combat by 1 May 1945, the date when 381 Type XXIs and 95 Type XXIIIs had been planned for delivery.⁹⁸ On top of the construction delays, the constant mining of the Baltic from the air inhibited the extensive training required on the new boats, delaying still further their introduction to service. Albert Speer elaborates on the effects of the bombing: "We would have been able to keep our promise of delivering forty boats a month by early in 1945, however badly the war was going otherwise, if air raids had not destroyed a third of the submarines at the dockyards."⁹⁹ For all the aforementioned reasons, hardly any of the new boats were operational at war's end, although their success in a few engagements trumpeted great promise. It was once again a case of "too little, too late."¹⁰⁰

Paving the Way for Operation Overlord

The strategic bombing campaign made possible a direct invasion of northwest

Europe in the summer of 1944. The lodgement in Normandy was a direct result of the generalized destruction of the German industrial and economic war machine, particularly the German Air Force, prior to the actual invasion. The secondment of Bomber Command and the Eighth Air Force from April until September 1944 to Supreme Headquarters Allied Expeditionary Forces under General Eisenhower resulted in a significant depletion, destruction and disorganization of the Luftwaffe, as well as the enemy's rail communications, prior to the invasion. In its immediate wake, these formations provided overwhelming direct tactical support for the land campaign. Bomber Command was particularly zealous in its pursuit of rail targets, attacking over one hundred of them prior to D-Day. Since much greater accuracy was possible in 1944, by June, most of the 37 rail centres assigned to Bomber Command were either destroyed or heavily damaged. These efforts, coupled with the destruction of the Seine River bridges the week prior to the invasion, made effective German reinforcement virtually impossible. Air superiority then secured the flanks of the lodgement area after the landings, and concomitant attacks on oil production facilities further significantly handicapped both the German Army and Air Force.⁹⁸

Along with attacking other major military targets in France, Bomber Command dropped some 14,000 tons of high explosives on the Atlantic Wall fortifications during the prelude to the landings, including 5,000 tons of explosives on the defending beaches themselves.¹⁰¹ After the ground forces were ashore, the Command continued its attacks on rail and military targets, including successful efforts against the ports of le Havre, Boulogne, Brest, Calais, St. Malo, and Cap Gris Nez. Most of France had been cleared of the enemy when Eisenhower handed control of Bomber Command back to the RAF on 16 September 1944. However, the Command continued to support the land armies in a tactical sense whenever called upon, including during the late-war push into Germany. The words of Joseph Goebbels bear testimony: "the enemy is afraid of severe casualties but, as soon as he meets resistance, he calls in his air force which then simply turns the area of resistance into a desert."¹⁰²

The German Civilian Tragedy in Perspective

Collateral civilian casualties within the Greater German Reich are estimated by various sources to be approximately 410,000 civilian fatalities attributable to Allied bombing. However, to this number one must add 23,000 non-military police and civilians attached to the German armed forces, 32,000 foreigners and prisoners of war, and 128,000 displaced persons, which brings the total to approximately 593,000 persons. A further 60,000 Italians need to be added to this total within the context of the European Axis states. An additional 486,000 people were wounded or injured by the bombing within the Greater German Reich alone. While these are large numbers, they pale next to the genocide perpetrated on the peoples of Europe and Eurasia by the Germans and their allies. In the bombing war, in comparison, Great Britain lost roughly 65,000 civilians to aerial attack,

approximately 43,000 of which occurred during the Blitz of 1940–41.¹⁰³ Total wartime losses in the German armed forces were approximately 3.8 million killed.¹⁰⁴ In pursuit of the stated Allied war aim of de-housing the civilian work force, 3,370,000 dwellings in the Reich were destroyed by the bombings, and 7,500,000 persons were made homeless.

The civilian loss of life from the bombing has, in Richard Overy's words, "occasioned the most bitter recriminations of all against the bombing strategy. It is something that Bomber Command survivors take seriously and have thought about deeply." Overy argues that the British Executive no longer felt obliged to act in restraint after the German bombing of Warsaw and Rotterdam during the war's opening stanzas, and that the tens of thousands of British deaths during the Blitz and the Baedeker Raids on British cities other than London "made redundant any further discussion about the rights and wrongs of

The city of Cologne in Germany was devastated during the Second World War, largely by aerial bombing, as seen in this photo taken in 1945.





US Air Force Photo 52064 AC

The original caption of this US Air Force photo reads: "Celestial Patterns – On their way to strike the heart of Hitler's domain. Berlin. Boeing B-17 Flying Fortresses of the US 8th Air Force leave fleecy vapor trails as they roar overhead."

bombing targets with the risk of civilian casualty."¹⁰⁵ Those who see fit to challenge the morality of the area bombing in particular should bear in mind that a far greater travesty would have been to allow the moral obscenity that was the Third Reich to prevail unchecked by whatever means were deemed necessary at the time.

Bombing conducted for the purpose of lowering enemy morale was not practiced exclusively by Bomber Command. We have covered the American attitudes and policies on area bombing, as practiced generally in Operation Thunderclap and Operation Clarion, and particularly at Dresden and Berlin. Major-General Frederick L. Anderson Jr. was the commanding general of the American Eighth Bomber Command for most of the Combined portion of the European air war. General Anderson noted that while the isolated, late war American bombing of mainly smaller urban centres was not expected in itself to shorten the war, "it is expected that the fact that Germany was struck all over will be passed on, from father to son, thence to grandson, (and) that a deterrent for the initiation of future wars will definitely result."¹⁰⁶ As the late-war evidence of Nazi atrocities mounted, best exemplified by the overrunning of the death camps and the institutionalized murder committed therein, there developed a significant Allied emotional

hardening reflected in the partial tactical use of strategic bombers during the push through Germany in the closing weeks of the war. If a German urban area resisted and generated Anglo-American casualties, it was normally shelled and bombed into rubble. However, those centres that acquiesced peacefully were normally spared further destruction. For the most part, similar courtesies were not extended during the Soviet advance, and German citizens were quite aware of the distinction.¹⁰⁷ These actions reinforced the point that no citizen of the Third Reich was immune or exempt from the bombing, and that further armed resistance was futile. This deliberate demoralization of the enemy undoubtedly helped shatter the German will to resist, hastening the capitulation of German forces in the western urban centres, and thereby saving many lives, both Allied and Axis. In short, those running the war in the Allied camp believed that Nazism was an evil force let loose on the world, and it needed to be eradicated as quickly as possible and by whatever means necessary. The circumstances which prevailed during the war determined the bombing policy which was to follow, and this writer feels it is only appropriate to judge it in that context, rather than through the application of latter-day social and political values.

Allied Public Support for the Bombing

Public opinion surveys from the war confirm widespread Allied support for the bombing.¹⁰⁸ Neither politicians nor historians of the period challenged the policy at the time, and while British authorities staunchly maintained that civilian casualties were nothing but "an unfortunate by-product of attacks on industrial areas, there is little reason to believe that the general public would have complained had it been otherwise."¹⁰⁹ Further, there was very little questioning of the morality of the bombing during the war, and what little that did occur came primarily from isolated British religious leaders. In the spring of 1941, the Bishop of Chichester, George Bell, and Doctor Cosmo Lang,

the Archbishop of Canterbury, both felt that the still-embryonic policy of bombing non-combatants should not be allowed to prevail. However, most British clerics supported the bomber offensive through its various stages of development. Dr. Cyril Garbett, the Archbishop of York believed that “often in life there is no clear choice between absolute right and wrong; frequently the choice has to be made of the lesser of two evils...and it is a lesser evil to bomb a war-loving Germany than to sacrifice the lives of thousands of our own fellow-countrymen...and to delay delivering millions now held in slavery.”¹¹⁰ Garbett then went on to argue compellingly in favour of Allied use of air power to bring the conflict to a swift, successful conclusion. These views were published in *The Times* on 25 June 1943, and they had the unequivocal approval of Lambeth Palace, home of the Archbishop of Canterbury.¹¹¹ Indeed, William Temple, who succeeded Cosmo Lang as the Archbishop of Canterbury, echoed Garbett’s stance in favour of the bomber offensive, as Lang had also eventually done. Temple, reluctantly and yet with total conviction, concurred that the bombing was a necessary evil in a world far from perfect. In December 1942, he wrote opponents of the area bombing policy in part: “The worst of all things is to fight and do it ineffectively. Therefore, while I agree with you strategic consideration cannot stand alone, [the bombing] becomes very nearly decisive for our conduct.”¹¹² Martin Middlebrook also offers the following opinion: “A country fighting for its very existence cannot afford to have strict boundaries of morality in the means by which it saves itself. It is sheer humbug to suggest that the use of bombers at this time was wrong when it was touch and go whether Britain survived at all.”¹¹³

The Legality Issue

Even the German camp has long acknowledged that, moral issues aside, the area bombing policy as it was conducted during the Second World War was perfectly legal. During the war, Eberhard Spetzler was a legal staff officer in the *Luftwaffe*. Post-war, when he was a professor of law at the University of Göttingen, he opined that:

Since there are separate rules for land and sea warfare and none was ever signed for aerial warfare, the Rules for Land Warfare cannot be

applied to strategic bombing. Article 25 clearly states that it is meant to protect civilians during the physical conquest of their land. Bombers do not occupy enemy territory, they only destroy it. For a city to be protected by Article 25, it must not have any defenses. Fighters attacking bombers over their target must be considered [to be] defending the city.¹¹⁴

The area bombing of enemy cities has only been illegal since August 1948, when the Red Cross Convention on the Protection of Civilians in Wartime was signed in Stockholm.¹¹⁵

The widespread damage resulting from the fire raids on Rostock and Lübeck in March and April of 1942 was candidly and appreciatively reported to the British public at the time, and in far-away Ottawa, similar sentiments were recorded by none other than Prime Minister Mackenzie King. He noted in his diary that the Germans were the ones who had first embarked on an indiscriminate bombing policy.¹¹⁶ While B.K. Sandwell, the liberalist editor of *Saturday Night* worried about the moral toll it would take on the crews themselves, in the end, he had to side with the policy:

The defeat of Germany can only be brought about by killing Germans, and if the object of these raids is to kill Germans...it is a perfectly proper object. The blood of such innocent persons as these is not on us...The whole German people brought on themselves whatever calamities may issue for them out of this war, when they put themselves under the kind of government which was bound to make such a war ultimately inevitable. It is our unavoidable task to make Germany suffer.¹¹⁷

Other national papers echoed Sandwell’s opinions:

In its editorial of 31 May 1943, the Toronto Telegram declared that, while bombing undoubtedly meant “misery and death for the people of the Axis nations...it is better that they should be blotted out entirely than that the world should be subjected to the rulers they have tolerated so long, and there are many who hold that they must be made to know in full the horrors of war, if a new war is to be avoided.” The Winnipeg Free Press, meanwhile, had already belittled the few who demanded limitations on bombing because they were asking “air crews still more to endanger their own lives so that they may perhaps save the lives of workers in industrial war facilities or living in the immediate neighbourhood of those targets.”¹¹⁸

From a participant's standpoint, CAN/RAF pilot Kenneth McDonald recalls the manner in which he and his crew were received by factory workers on a motivational visit following his operational tour in 1943:

I can testify to the hatred war breeds. When we finished our tour of operations in 1943, we were sent as a crew on a morale raising round of factories in London that were making Halifaxes. My job was to describe a typical op and to introduce the crew members. Each time I came to Tim McCoy, the rear gunner, and told the assembled workers that he could see the fires from fifty miles away on the trip home they burst into cheers. Those men and women had lived through the London Blitz, had lost homes and relatives, were still at risk from German bombs, and felt I'm sure that here in front of them was living proof not only that their work was worthwhile but that there was hope for an end to the war and their privations. They too had lived through the thirties when Hitler and his brownshirts took power, had witnessed on film and in newspapers the transformation of a country not unlike their own into an armed camp that threatened its neighbours while bullying or murdering any of its own citizens who dared to protest or who were judged to be racially or otherwise unpure.¹¹⁹

Area Bombing and the Japanese War

Not the least of the wartime contributions of the Allied bombing campaign in Europe was that its success inspired a similar late-war campaign against the industrial cities of the Japanese home islands. The strategic area bombing of Japan, conducted by the American 20th Air Force in 1944 and 1945, destroyed an area thirty times greater in size than did the two atomic weapon releases at Hiroshima and Nagasaki in August 1945. Ironically, when high-level daylight bombing with high explosives proved ineffective and costly early in the campaign, the Americans borrowed a page from Bomber Command by conducting a series of night raids at relatively low level using incendiaries. The success of this area bombing was a result of the unfettered use of those incendiary weapons against highly flammable targets that deliberately created firestorms. In reality the loss of 250,000 Japanese lives, the wounding or injuring of a further 500,000 and the destruction of 40 percent of the buildings in 66 industrialized cities had brought Japan to the brink of surrender prior to the atomic bomb

drops on the 6th and 9th of August.¹²⁰ And yet, based on the fierce determination to resist an Allied invasion of the home islands, exemplified by the sacrifice of 2,530 Japanese Navy aircrew members¹²¹ and at least as many Army aircrew¹²² on Kamikaze missions directed against Allied shipping (the last of which took place on the day of the cessation of hostilities, 15 August 1945), the Allied Executive was greatly concerned about the blood cost to both sides should an invasion of the Japanese home islands prove necessary. Winston Churchill elaborates:

We had contemplated the desperate resistance of the Japanese fighting to the death with Samurai devotion, not only in pitched battles, but in every cave and dugout. I had in my mind the spectacle of Okinawa Island, where many thousands of Japanese, rather than surrender, had drawn up in line and destroyed themselves by hand grenades after their leaders had solemnly performed the rite of hara-kiri. To quell the Japanese resistance man by man and to conquer the country yard by yard might well require the loss of a million American lives and half that number of British—or more if we could get them there: for we were resolved to share the agony.¹²³

Indeed, the Japanese War Cabinet, the military clique under the control of the Prime Minister, General Hideki Tojo, was determined to commit the Japanese people to mass suicide, calling “for the sacrifice of up to 100,000,000 Japanese lives, if necessary, to repel the Allied invasion of the home islands.”¹²⁴ The area bombing of Japan had certainly dealt a debilitating blow to the Japanese war industries, and the remaining factories were on the verge of collapsing for want of component parts and damage to infrastructure. And yet, in July 1945, the Japanese aviation industry was still capable of producing over 1,000 military aircraft per month, and many hundreds of warplanes were still available for home defence.¹²⁵ There was also no shortage of suicidally-inspired pilots available and willing to substitute courage for technological inadequacy and dive the aircraft into a massed Allied invasion force. Furthermore, “orders went out that every Japanese man between the ages of 15 and 60 and all women aged 17 to 40 would meet the invaders at beaches with sharpened bamboo poles. Allied peace feelers were rejected.”¹²⁶

Although it was a painful decision for the Allies, the two atomic drops, with the

concomitant loss of an additional 150,000 Japanese citizens, combined with a rapidly worsening war situation, largely precipitated by the area bombing of the industrial cities, convinced the Japanese that further resistance was pointless. Defending against the massed fleets of formidable, heavily-protected B-29 Superfortresses was difficult enough, but the atomic drops on Hiroshima and Nagasaki convinced them that they were powerless to defend the entire nation from the high and fast-flying, singly-penetrating B-29s that could bomb anywhere in the nation. This underscored the futility of further resistance and spared the Japanese people from the obligation of being killed to the last available fighting man and woman. Therefore, strategic bombing undoubtedly ultimately prevented many casualties, both Allied and Japanese, by eliminating the need for an armed invasion of the Japanese mainland, the costs of which, measured by any yardstick, would have been horrific.

It is perhaps appropriate that the area bombing policy's most dedicated champion, Sir Arthur Harris, should have the last word on the moral justification of command policy. In one of his most famous newsreel speeches of the war, he reminded his audience that it was the Nazis who had "sown the wind," and that, in return, they would "reap the whirlwind."¹²⁷

* * * * *

Bomber Command played an essential part as a guarantor of Allied victory during the Second World War. It provided an offensive tool that took the fight to the enemy when none other was available, and it gave the citizens of the Allied nations hope and pride while it did so. It provided Britain and the Commonwealth, through its very prosecution, a political dimension by which it could influence the conduct of the war. Its operations demanded a significant diversion of German resources away from the Eastern Front, thereby aiding the USSR in its part of the combined struggle. The Command struck substantial and unrelenting blows against enemy morale. It threw Germany's broader war strategy into disarray, and generated a loss of German air superiority, along with doing much significant damage to the Reich's war industrial base. Its actions made the way safer

for an Allied re-entry into northwest Europe in 1944, and it effectively stymied German economic mobilization and technological development in many areas. While a great human price was paid for these accomplishments on both the combatant sides, in relative terms, the losses incurred to the Anglo-Americans were small when compared to those suffered elsewhere, such as in the USSR. And the overall cost was relatively low as a percentage of the total war effort, considering the gains that were realized.

Canada's contribution to this campaign was highly significant, and the nation should be extremely grateful to those warriors of the night who held firm and proud from the right of the line in European skies so many years ago.

Although the air war was only a part of an enormous conflict that swept over Europe, it did prove decisive in helping the Allies achieve victory, since it played an indispensable role, without which the Anglo-American lodgement on the continent and the final defeat of the Third Reich was inconceivable.¹²⁸

What bombing (in part) did—both area and precision—was to act as a constant source of attrition for most industrialists, interrupting transport flows, hitting small component factories, attacking gas, electricity and power supplies. Many of these were not critical but the important thing was their cumulative effect.¹²⁹

Notes

1. Richard Overy, *Bomber Command 1939-1945: Reaping the Whirlwind* (London: Harper Collins, 1997), p.200.
2. Mark K. Wells, *Courage and Air Warfare: The Allied Aircrew Experience in the Second World War* (London: Frank Cass, 1995), p.2.
3. *Ibid.*, p.16.
4. Overy, *Bomber Command*, p.204. For the record, 1,479 men and 91 women in ground crew duties, often hazardous, were also killed during the war. Richard Holmes, *Battlefields of the Second World War* (London: BBC Worldwide, 2001), p.180.
5. Larry Milberry, *Canada's Air Force: At War and at Peace*, Vol. 2 (Toronto: CANAV Books, 2000), p.127.
6. Of note, Robin Neillands appears to be the only reputable author who cites 110,000 versus 125,000 as the total number of aircrew who flew with Bomber Command during the war years, nor does Neillands cite his source. Sir Arthur Harris and a host of other distinguished sources, including Richard Holmes, all use the 125,000 figure. Further, if Neillands' total

- number is correct, then the overall fatal loss rate climbs from 45 percent to 51 percent. Robin Neillands, *Bomber War: The Allied Air Offensive Against Nazi Germany* (Woodstock, NY: Overlook Press, 2001), p.379.
7. Arthur Harris, *Bomber Offensive* (London: Collins, 1947), p.267, and Overy, *Bomber Command*, p.202.
 8. *Ibid.*, p.209; John Terraine, *The Right of the Line: The Royal Air Force in the European War, 1939-1945* (London: Hodder and Stoughton, 1985), p.537.
 9. Overy, *Bomber Command*, p.209.
 10. Franklin D'Olier, et al, *The US Strategic Bomb Survey, Overall Report, European War, Sep 30, 1945* (Washington, DC: US Government Printing Office, 1945), p.71.
 11. <<http://www.nucleus.com/~ltwright/bc-stats.html>>
 12. The earlier years were proportionately much more dangerous. For example, in 1942, the average loss rate per operation was 4.1percent. By 1944, this had diminished to 1.7 percent and by 1945, to 0.9 percent; the latter two years represented nearly two-thirds of the Command's wartime sortie total. Overy, *Bomber Command*, p.204.
 13. Of the 1,113 U-boats commissioned after the start of hostilities, plus the 56 available at war's commencement, 821 or 70.23 percent would be lost due to enemy action or marine accidents, and of the 41,000 personnel attached to the wartime U-boat arm, more than 27,000 or 66 percent would forfeit their lives. Roger Sarty, *Canada and the Battle of the Atlantic* (Montreal: Art Global, 1998), p.160; V.E. Tarrant, *The U-Boat Offensive 1914-1945* (London: Cassell, 1989), p.169. Specifically, out of 859 boats sent on war patrols, 648 (75 percent) were lost and a full 429 of these yielded no survivors. Clay Blair, *Hitler's U-Boat War- The Hunted 1942-1945* (New York: Modern Library, 2000), p.705.
 14. Allan English, *The Cream of the Crop: Canadian Aircrew, 1939-1945* (Montreal & Kingston: McGill-Queen's Press, 1996), pp.137, 140-141.
 15. The Bomber Harris Trust, *A Battle for Truth*, (Agincourt: Ramsey, 1994), p.25. The 40,000 RCAF Bomber Command airmen were but a fraction of the total 93,844 "all trades" RCAF personnel who served overseas. Brereton Greenhous, Stephen J. Harris, William C. Johnston, and William G.P. Rawling, *The Crucible of War 1939-1945: The Official History of the Royal Canadian Air Force*, Volume 3 (Toronto: University of Toronto Press, 1994), p.xxiii.
 16. *Ibid.*
 17. These statistics provide a chilling counterpoint to the casualties sustained by the Canadian Expeditionary Force during the Great War. Of the 619,636 men who were enlisted, 9.6 percent became fatal casualties, while a further 27.9 percent were non-fatally wounded, producing a total casualty rate of 37.5 percent. At first glance, the overall Second World War RCAF bomber aircrew casualty rate of 32.67 percent compares favourably, but the total fatal casualty rate at nearly 25 percent is much higher. However, readers should bear in mind that a significant number of the non-fatal casualties would later prematurely succumb during peacetime as a result of their war wounds and inadequate follow-on treatment. Extrapolated from Desmond Morton and J.L. Granatstein, *Marching to Armageddon - Canada and the Great War 1914-1919* (Toronto: Lester & Orpen Dennys, 1989), Appendix B, p.279.
 18. Milberry, *Canada's Air Force*, p.41.
 19. Overy, *Bomber Command*, p.205.
 20. Milberry, *Canada's Air Force*, pp.93, 127.
 21. <<http://www.nucleus.com/~twright/bc-stats/html>>
 22. Greenhous, et al, *Crucible of War*, p.864.
 23. The range over the period was 65-87 percent, but it is felt that the 75 percent weighting counterbalances the period of maximum effort and participation, the latter months of the group's existence, with the significantly higher loss rates of the first year of operations. *Ibid.*, p.55.
 24. *Ibid.*, p.15.
 25. In January 1944, 16 Bomber Command squadrons, none of which were Canadian, were flying operations in the Mediterranean theatre, while another ten squadrons were doing so in the Far East out of India and Ceylon. All these units had very low operational loss rates compared to their UK-based counterparts. Overy, *Bomber Command*, pp.84-85.
 26. Participants are considered to be the estimated 40,000 RCAF aircrew who served, plus two-thirds of the 1,106 CAN/RAF aircrew known to have served directly in the RAF.
 27. Embedded within this statistic are even more chilling ones. For example, between 11-13 May 1943 and 21-25 June 1943, 6 Group's missing rate rose to 11.5 percent, and on the night of 12/13 May, on a raid to Duisburg, to 13.3 percent. Also, Halifax losses from mid-Dec 1943 to mid-Jan 1944 averaged 9.8 percent. Greenhous, et al, *Crucible of War*, p.671, 681.
 28. *Ibid.*, p.681.
 29. *Ibid.*, p.683.
 30. Gardening operations involved laying mines in enemy waters. During the (generalized) period of the Battle of Berlin "1081 crews failed to return from 24,754 night bombing sorties (4.36 percent), mining cost just twenty-one of 2078 sorties (1.01 percent). No. 6 Group contributed 395 of the latter, losing four crews, or exactly the overall percentage rate." No. 6 Group Analysis of Results, Directorate of History and Heritage, National Defence Headquarters, Ottawa, Ontario (DHH) 74/250.
 31. Overy, *Bomber Command*, p.183.
 32. To be precise, it was 430,747 tons dropped out of 955,044 total, or 45.1 percent. <<http://www.nucleus.com/twright/bc-stats/html>>
 33. Overy, *Bomber Command*, p.184.
 34. They also dreaded surges of effort similar to the Hamburg raids of July-August 1943 on other industrial centres.
 35. Overy, *Bomber Command*, p.185.
 36. *Ibid.*, p.191.
 37. Albert Speer, "Spandau: The Secret Diaries," in Bomber Harris Trust, *A Battle for Truth*, p.64.
 38. Overy, *Bomber Command*, p.191.
 39. Edward Jablonski, *American in the Air War*, (Alexandria, Virginia: Time-Life Books, 1982), p.142.
 40. Overy, *Bomber Command*, p.191.
 41. Jablonski, *American in the Air War*, p.142.
 42. E.L. Homze & H. Boog, *The Luftwaffe*, (Alexandria, Virginia: Time-Life Books, 1982), p.161.
 43. D'Olier et al, *US Strategic Bomb Survey*, p.60.
 44. Albert Speer, *Inside the Third Reich* (New York: Galahad, 1970), p.224.
 45. D'Olier et al, *US Strategic Bomb Survey*, p.60.
 46. *Ibid.*, p.61.
 47. *Ibid.*, p.62.

48. *Ibid.*, p.65.
49. Overy, *Bomber Command*, p.192.
50. Speer, *Inside the Third Reich*, p.299.
51. Overy, *Bomber Command*, p.197.
52. D'Olier et al, *US Strategic Bomb Survey*, p.19.
53. Williamson Murray, *The Luftwaffe- Strategy for Defeat* (Secaucus, New Jersey: Chartwell, 1986), p.223.
54. Memo No.529 (Special Distribution and War Cabinet from Switzerland), 28 Jul 1940, in The [British] National Archives [TNA], Public Record Office [PRO] Premier 3/11/1, p.35.
55. Churchill at War, The Prime Minister's Office Papers 1940-45, Unit 1, in TNA PRO Premier 3/11/4, p.144.
56. *Ibid.*, p.112, 116.
57. TNA PRO Premier 3/11/12, p.661.
58. *Ibid.*, p.627.
59. *Ibid.*, p.622.
60. TNA PRO Premier 3/11/7, p.290.
61. Denis Richards, *The Hardest Victory* (New York: Norton, 1995), p.112.
62. *Ibid.*, p.86.
63. Dudley Stewart, *Bomber Harris – The Authorized Biography*, (London: Cassell, 1984), pp.162-163.
64. Overy, *Bomber Command*, p.197; Richard Overy, "A Presentation to the Symposium on the Strategic Bomber Offensive, 1939-1945," RAF Staff College Bracknell, 26 March 1993.
65. D'Olier et al, *US Strategic Bomb Survey*, pp.96-97.
66. Speer, *Inside the Third Reich*, p.262.
67. D'Olier et al, *US Strategic Bomb Survey*, p.97.
68. *Ibid.*, p.98.
69. Joseph Goebbels, *Final Entries 1945* (New York: Putnam's, 1978), pp.117, 149, 299.
70. Speer, "Spandau: The Secret Diaries," p.64.
71. Burke Cahill, member, Canadian Committee for the Study of World War II, letter to Director General History, NDHQ, circa 2000 at <<http://www3.sympatico.ca/jimlynch/bharis60.htm>>, p.4.
72. Probert, *Bomber Harris*, p.337.
73. Götz Bergander, quoted in *Ibid.*, p.338.
74. Speer, *Inside the Third Reich*, pp.278-279.
75. Overy, *Bomber Command*, p.197.
76. Bomber Harris Trust, *Battle for Truth*, p.65; Overy, *Bomber Command*, p.213.
77. Overy, *Bomber Command*, pp.197, 214.
78. In fact, even *Luftwaffe* bomber commanders had long argued for a concentration on fighter production, far earlier than it was actually done.
79. Williamson Murray, *Luftwaffe – Strategy for Defeat* (Secaucus, New Jersey: Chartwell, 1986), p.225.
80. Matthew Cooper, *The German Air Force 1933-1945* (London: Jane's, 1981), p.377. Also between 1 September 1939 and 28 February 1945, the last date for which reliable figures exist, *Luftwaffe* fatalities included 44,065 aircrew killed and another 27,610 missing or captured. Alfred Price, *A Pictorial History of the Luftwaffe 1933-1945*, (London: Ian Allan, 1969), 59.
81. E.L. Homze and H. Boog, *The Luftwaffe* (Alexandria, Virginia: Time-Life Books, 1982), p.170.
82. Most of the remaining losses were attributed to flak.
83. Cajus Bekker, *The Luftwaffe Diaries* (London: MacDonald, 1967), p.380.
84. Specifically, the German night fighter arm accumulated a wartime total of 6,048 air-to-air victories, 215 during day operations and 5,833 at night. Of the latter total, only 1,041, or one-sixth, were gained over the Eastern Front. Gerhard Aders, *History of the German Night Fighter Force, 1917-1945* (London: Janes, 1979), p.239. Nachtjagdgeschwader I alone accounted for 2318.
85. Overy, *Bomber Command*, p.201.
86. Speer, *Inside the Third Reich*, p.365.
87. *Ibid.*, p.227.
88. *Ibid.*, p.229.
89. Antony Beevor, *The Fall of Berlin 1945* (New York: Viking, 2002), p.139. On 24 April 1945, Soviet troops reached Dahlem, and the Kaiser Wilhelm Institute for Physics the following day. Along with various pieces of useful equipment, NKVD troops found "250 kilograms of metallic uranium; three tons of uranium oxide; twenty litres of heavy water." *Ibid.*, pp.324-325. Furthermore, related work was being conducted at a plant in Stassfurt in northern Germany, where an Allied team led by John Lansdale, head of security for the Manhattan Project, found a cache of bomb materials on 17 Apr 1945. Specifically, the team discovered about 1,100 tons of ore, some in the form of uranium oxide. This team, the one known as the Alsos Mission, additionally rounded up several prominent German atomic scientists in the region within a week, including Werner Heisenberg and Otto Hahn. Anahad O'Connor, "John Lonsale" *The Scotsman*, 8 September 2003, at <<http://www.news.scotsman.com/obituaries.cfm?id=989462003>>
90. John Keegan, *The Second World War* (London: Penguin, 1989), p.582.
91. "Nazis Planned to Use Virus Against Britain," in the *Times*, 12 March 2001.
92. Brian J. Ford, *German Secret Weapons: Blueprint for Mars* (New York: Ballentine's, 1969), pp.106-110; *Forgotten Battles: The Weapons: Tabun Nerve Gas*, at <<http://www.geocities.com/pentagon/bunker/3351/germweps/tabun.html>>
93. Chester Wilmot, *The Struggle for Europe* (London: Wordsworth, 1998), p.620.
94. Noted in Martin Middlebrook, *Nuremberg Raid* (London: Viking, 1986), p.312.
95. Jan Heitmann, "Destroying the Hamburg U-Boat Pens," in *After the Battle*, Vol. 3, (London: Battle of Britain International, 2001), pp.30-31.
96. Speer, *Inside the Third Reich*, p.273.
97. *U-Boat – The Elektroboats – Getting Ready*, at <<http://uboat.net/technical/electroboats3.htm>>
98. *Ibid.*
99. Speer, *Inside the Third Reich*, p.274. On the night of 8/9 March 1945, 312 Bomber Command aircraft dropped 983 tons of bombs on Hamburg, inflicting heavy damage on the Blohm & Voss shipyard and also destroying boats at the Howaldswerke yard. On 31 March, 469 aircraft dropped 2,217 tons, inflicting more severe damage on the Howaldswerke facility. Again on 9 April, 17 specialty Lancasters bombed Hamburg's Fink II pens with 15 Tallboys and two ten-ton Grand Slams, causing serious damage to the pens themselves, as well as the neighbouring barracks, boiler houses, storage houses and workshops. The night prior to this impressive day raid, 440 Main Force bombers had dropped 1,481 tons on the Hamburg port facilities. Heitmann, "Destroying the Hamburg U-Boat Pens," pp.34-35.
100. Only Type XXIs *U2511* and *U 3008* were operational by the end of hostilities. Robert Hutchinson, *War*

- Beneath the Waves* (London: Harper Collins, 2003), p.104.
101. Overy, *Bomber Command*, p.88.
102. Goebbels, *Final Entries 1945*, p.298.
103. Holmes, *Battlefields of the Second World War*, p.215.
104. Overy, *Bomber Command*, p.202; Cajus Bekker, *Luftwaffe War Diaries* (London: MacDonald, 1967), p.386.
105. Overy, *Bomber Command*, p.202.
106. TNA PRO documents as quoted in Richard Norton-Taylor's "Allied Bombers Chose 'Easy' Targets," in the *Guardian*, August 23, 2001.
107. In spite of all their pious, post-war posturing, particularly with respect to Dresden, the Soviets made no attempt whatsoever to spare the Reich's civilians from bombing or shelling. In fact, quite the opposite occurred.
108. Wartime polling on the bombing was frequent. Some representative examples follow:
- Canada, 11 November 1942 – "Do you approve or disapprove of bombing Germany's civilian population? Of Italy's? Of Japan's?" (CIPO)
- | National Total | Germany's | Italy's | Japan's |
|----------------|-----------|---------|---------|
| Approve | 57% | 51% | 62% |
| Disapprove | 38% | 44% | 34% |
| Undecided | 5% | 5% | 4% |
- Great Britain, December 1943 – "How do you feel about the bombing?" (Only one answer per respondent allowed) (BIPO)
- Satisfaction, getting some of their own medicine, keep it up – 47%
- We are justified in doing it. It is necessary – 17%
- Dislike bombing but necessary under present circumstances – 16%
- Sorry for the kids and old people but it's necessary – 3%
- They should bomb only industrial plants and communications – 2%
- I am against bombing – 7%
- Miscellaneous – 6%
- No answer, don't know – 2%
- Great Britain, Dec 1943 – "What do you think are likely to be the effects of the bombing of German cities?" (Only one answer per respondent allowed) (BIPO)
- Upsets German morale – 40%
- It will shorten the war – 24%
- Smash war industries – 10%
- Bombing will win the war – 3%
- Bombing alone will not win the war – 3%
- Germans will retaliate – 2%
- Miscellaneous – 9%
- Don't know – 5%
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113. Middlebrook, *Nuremberg Raid*, p.314.
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119. Kenneth McDonald, letter to author, 25 August 2000, from letter to Thomas Fleming, 22 July 1997.
120. Hew Strachan, *European Armies and the Conduct of War* (London: Routledge, 2001), p.188.
121. Statistic from Japanese Navy Kamikaze memorial, naval museum, Japanese Maritime Self-Defence Force Officer Candidate School, Etajima Japan, 16 July 2002.
122. Masatake Okumiya, Jiro Horikoshi and Martin Caidin, *Zero* (New York: ibooks, 1956, 2002), p.354.
123. Winston Churchill, *The Second World War*, Vol. 2, (New York: Time-Life Books, 1959), p.561.
124. Statistic from the Hiroshima Peace Museum, Hiroshima, Japan, 15 July 2002. The War Cabinet was apparently figuratively calling for the sacrifice of every Japanese man, woman and child, if necessary, since the total population of Japan as late as Apr 1947 was just over 73 million.
125. Okumiya, *et al*, *Zero*, pp.362, 378.
126. Edward Jablonski, *America in the Air War* (Alexandria, Virginia: Time-Life Books, 1982), p.169; Peter Jennings and Todd Brewster, *The Century* (New York: Doubleday, 1998), p.276.
127. Quoted in Overy, *Bomber Command*, p.202.
128. Williamson Murray, *Strategy for Defeat*, p.234.
129. Overy, "Presentation to the Symposium," p.19.

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