

Antwerp and the German Attack on Allies Supply Lines 1944-1945

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Long before the Allies landed on the beaches of Normandy on June 6, 1944, World War Two had become more a war of resources than a war of maneuver and combat. The Allies had enormous resources on both fronts while German assets were shrinking as they lost conquered lands in the east to the advancing Soviet Army. On the days following the assault on Normandy, the Allies secured a bridgehead on the continent, but then German resistance stiffened and the Battle of Normandy settled into a nearly static front with gains measured in yards rather than miles. The supply situation for the Allies was relatively simple since there was no great forward movement. Supplies could be delivered from the beach to the combat troops with very little motor transport. While the Germans could not dislodge the Allied hold on that strip of the French coast, they limited the supplies and ammunition that could come ashore by keeping the front narrow and denying the Allies the use of any of the French ports. Hitler, realizing the ports were critical, ordered them held to the last and the garrisons of some ports like St. Nazaire and Lorient did not surrender until the war was over. The Allies captured Cherbourg on the tip of the Cotentin Peninsula on June 27, 1944, but the Germans had done such an efficient job of demolition that the port did not open until July 19. A few days later, the Americans ruptured the German line with "Operation Cobra," a carpet bomb attack, and the German position in Normandy collapsed. Allied armies raced to the Seine and the Germans, under Hitler's orders, mounted an ill-conceived counter-attack at Mortain on August 6. The German attack created a salient and the Allies used the opportunity to surround the German forces in France in the "Falaise Pocket," destroying thousands of vehicles and killing or capturing tens of thousands of German troops. The battle for the pocket was over on August 25 and Paris was liberated the same day. All organized German resistance west of the Seine River collapsed and the Allies pursued, crossing that river before the Germans could mount any meaningful opposition. The rapid pursuit took Allied units farther and farther from their main source of supply which was the port of Cherbourg and the beaches of Normandy. For many units this meant a distance of more than 500 miles. The long supply lines led to shortages, particularly fuel and ammunition and resources had to be rationed, a process which led to a certain amount of bitterness between the allies. One U.S. First Army staff officer complained that the race across France had been impaired because the gasoline had been given to "the British to enable them to take the channel ports, to capture the V-1 bomb sites and to bring them faster into Antwerp."¹

In 1944 U.S. Army Transportation doctrine called for the greatest possible use of railroads to move supplies because it was the most efficient means of hauling large amounts of cargo. This wasn't possible in France in the late summer of 1944 because Allied bombers had destroyed much of the French rail system and while Allied railroad crews worked day and night

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to repair the damage, supplies piled up on docks and beaches. In addition to fixing the railroads the Allies embarked on two other courses of action to improve the logistical situation in the theater. The first was a short term measure to use trucks to operate one-way circular routes to supply U.S. troops. The "Red Ball Express," perhaps the most famous, was only one of several such truck operations. The plan called for 141 truck companies which the Allies did not have because they had declined to bring additional support troops into the narrow beachhead. There were also not enough drivers so personnel and trucks had to be stripped from existing units. To make matters worse, the majority of the trucks were 2 ½ ton light trucks instead of 10 ton tractor trailers designed for line haul operations. The round trip was 1,276 miles and the operation which was begun on August 25 was supposed to end in September but was extended to November. It took a terrific toll on the trucks and personnel but it moved 412,000 tons of cargo in its 81 days of operations.² The British had their own problems with transportation. They discovered that 1,400 3-ton trucks were defective and the vehicle shortage reduced the supplies to Montgomery's troops by 800 tons a day.³ A long term measure was to capture ports closer to the front. In rapid succession, the Allies captured Rouen on August 30; Antwerp on September 4; Le Havre on September 12; and Brest on September 18. Because the Germans had systematically wrecked most of the ports it took some time before they were serviceable. Le Havre was opened on October 9 and Rouen on October 16. Brest was so far from the front that after it was captured no effort was made to repair and use it.

The Port of Antwerp was seen as the solution to the Allies logistical difficulties. The importance of the port to the Allies can be summed up in a message Eisenhower wrote to Marshall on October 23, 1944 stating, "the logistical problem had become so acute that all plans had made Antwerp a *sine qua non* to the waging of the final all-out battle."⁴ Antwerp, one of the world's great natural harbors, lies on the Scheldt River which flows into the North Sea. The River is divided by South Beveland before it reaches the sea dividing it into the Eastern and Western Estuaries. It is the latter that is used for sea access to the port of Antwerp. At the extreme western end of South Beveland is Walcheren Island, occupation of which controls access to the port. The Germans were well aware of the potential the port held for the Allies. In early September, Hitler ordered General von Zangen's Fifteenth Army which occupied South Beveland and Walcheren Island to block the Scheldt estuary making the port useless to the Allies even if they captured the city. According to an Associated Press release issued after the battle Canadian troops captured enemy documents "indicating that the defense of the Scheldt approach to Antwerp was the decisive factor in the further conduct of the war. According to the same source an order was issued on 7 October by the 15th German Army Commander, General Gustav Non (sic) Zanger, showed that the German High Command feared that with the port of Antwerp in allied possession, a death blow might be dealt to Northern Germany and Berlin before winter. German troops were urged to defend the Scheldt blockade position at all costs."⁵ Before they left, the Germans warned the inhabitants that they would send over 3,000 planes to bomb the city on the day the first Allied ship entered the port.

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The port itself was occupied relatively easily and quickly. On September 4, the British 11th Armored Division raced into the city and captured the port intact. However, they failed to seize the bridges over the Albert Canal and when the British decided to cross two days later the Germans blew them up. The Germans occupied South Beveland and Walcheren Island, but the seriousness of the failure to capture South Beveland and Walcheren Island was not immediately evident. Market Garden was in the works and that promised to end the war quickly. With the failure of Market-Garden, the Allied need for a port close behind the advance to the German border became acute. In retrospect, the failure of the British to completely occupy Antwerp in September has to be considered one of the major Allied blunders of the war in Europe. In October the areas blockading access to the port had to be cleared. The Canadian 2nd Division attacked South Beveland along the narrow isthmus that connects it to the mainland. On the night of October 25-26, the British 52nd Division conducted an amphibious night assault on the south shore of South Beveland and the two forces mounted a two-pronged attack which cleared the area by October 30. An amphibious assault against Walcheren Island was conducted the next day and by November 9, the island was in Allied hands. The cost of the entire operation was 27,633 Allied casualties.⁶ With the land occupied, the Allies expected to open the port on November 15, but the Royal Navy needed an additional two weeks to clear the mines the Germans had sown in the estuary. They finished the job on November 26. The port officially opened two days later when the *James B. Weaver*, a liberty ship with the personnel and equipment necessary to set up a port headquarters, the 268th Port Company and a critical cargo of war correspondents berthed in Antwerp. Prior to this the Americans loaded thirty-six 22 ton low bed trailers with equipment for port operations from the Depot at Bricquebec and drove the 500 miles to Antwerp to insure that no time would be lost in unloading cargo. Unloading began immediately, but it was nearly three months after the city and docks were first occupied.

The Allies had every reason to feel pleased with themselves. Unlike Brest and Cherbourg which had been totally wrecked by the retreating Germans, Antwerp with its modern berthing facilities, 592 cranes, dry docks and storage capacity for 120 million gallons of fuel was mostly untouched. Only a few sunken craft had to be raised and some dredging had to be done. Antwerp was considered a British advanced base and the Americans were only to operate their part of the port to discharge cargo from arriving ships and clear the cargo from the port. American supplies were to be put on rail cars, barges or trucks at quayside and moved without delay to their forward depots at Liege and Luxembourg City. Command of the port fell to a British Naval Officer who had as subordinates a British and a U.S. port commander which meant that Antwerp was run as two separate ports. This particularly suited U.S. Army transportation officers who had not liked the way the English ran their ports in England and wanted to run their ports their own way. The U.S.-British Agreement called for a discharge rate of 17,500 tons per day for British and 22,500 tons per day for the U.S. The agreement stated. "Allocation of Berths: US Forces to have that portion of the port North of a line drawn through Albert Dock through Berth 140 on the east and between Berths 115 and 117 on the west, including the north portion of Albert Dock, the Leopold Basin, the Vierde Habendock, Quatrieme and the Hansadock adjacent to the Kruisschens Locks. British Forces to have the remainder of the Albert dock south of this line, and including the

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Lefebvre Dock and the Amerikadok."⁷ The discharge rates were exclusive of bulk petroleum, oil and lubricants (POL). The Allied planned rate of discharge was much lower than of which the port was capable. Antwerp had a peacetime discharge capability of 80,000 to 100,000 tons of cargo per day. The lower rate was planned because port storage was limited and the Allies wanted a manageable rate that allowed for immediate port clearance.

River berths 1 - 29 were under the control of the port commander and were to be allocated on the basis of need. The North Marshaling yards were to be operated for joint use by US forces and the South Marshaling yards by British forces. Allocation of rail lines were U.S.: ANTWERP-LOUVAIN-LIEGE and ANTWERP-BRUSSELS-NAMUR-LUXEMBOURG; and the British: ANTWERP-ECKERN; ANTWERP-HERENTHAIS-ROERMUND; and ANTWERP-AERSCHOT-HASSELT. Highway Allocation for the U.S. was ANTWERP-MALINES-LOUVAIN-LIEGE and ANTWERP-MALINES-LOUVAIN-NAMUR and for the British ANTWERP-BOOM-BRUSSELS-MALINES.⁸ All movement was controlled by a joint committee and certain facilities such as bulk liquid petroleum and grain storage had to be shared. Later the port authorities concluded an agreement with the Belgians that established the conditions for Belgians working in the port. On an average day over 9,000 Belgian civilians worked in the port, and during one peak period over 13,000 were employed there. As a further assurance that things would run smoothly, Colonel Hugh A. Murrill who was Chief of the Control and Planning Division of Major General Frank S. Ross, Chief of Transportation E.T.O., became Ross' personal representative at the port. Colonel Doswell Gullatt, an Engineer officer who had commanded the 5th Special Engineer Brigade on Omaha Beach, and with considerable experience in port construction and port operations, was the American port commander. The Chief of Transportation assigned the 13th Major Port and the 5th Major Port with large numbers of supporting stevedore, truck, rail and military police units. The Americans were determined to make Antwerp work.

The Germans were unable to send the 3,000 planes they threatened, but random Luftwaffe bomber attacks and flying bomb and rockets were employed against Antwerp even before Allies opened the port. With so much importance attached to it, the Allies took prudent steps to defend the port against both aircraft and the flying bomb. Supreme Headquarters Allied Expeditionary Forces (SHAEF) appointed Major General A.M. Cameron, an experienced British Anti-aircraft officer, to conduct the air defense of the Allied held cities in Belgium. Cameron, who had served in Anti-aircraft Command and the War Office, was commanding an anti-aircraft group when he was assigned to SHAEF in May 1944. On October 4 he became Chief of the SHAEF Air Defense Division and was charged with protecting all the newly liberated cities within range of the flying bombs and conventional German aircraft. Since he had little experience with flying bombs, he immediately asked for assistance from Air Defense Great Britain and an advisory team was assigned to his headquarters to assist in creating the defenses necessary to neutralize the flying bomb attack. Cameron's was a joint command and the responsibility for the defense of Brussels was assigned to the British and the defense of Antwerp was assigned to the Americans under the command of Brigadier General Clare H. Armstrong. Armstrong, a native of Minnesota had been

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commissioned a lieutenant in the infantry when he graduated from West Point in 1917, but in 1930, he transferred to the Coast Artillery, the branch responsible for anti-aircraft artillery in the U.S. Army. He took command of the 86th Coast Artillery Regiment in May 1942, then took command of the 50th Anti-aircraft Brigade in February 1944. He took the unit to Europe and commanded it until the end of the war.

Based on experience with the recent flying bomb attack on England, Cameron's staff estimated that 105 V-1s and 40 V-2s could be launched against the city daily. However, they felt the actual number of hits on the port would be very low and estimated the estimated that the daily damage to the 12 sq. miles of the actual port and its facilities would be .025% per day for every 100 ships receiving a direct hit. Indeed, both the estimated damage to the port and the slight probability of a ship being hit was so low that Allies estimated that it would take the Germans several months to seriously affect the functioning of the port. They felt the war would be over by the end of 1944, a dangerous arrogance they shared with the tactical planners, and that the situation would not leave the Germans enough time to seriously damage the port. The planners also noted that both German weapons were exceedingly inaccurate and had the potential of destroying 885 homes some where in the 339 square miles of Greater Antwerp area on a daily basis. They estimated total casualties of dead, seriously wounded and slightly hurt as somewhat less than 1,000.⁹ Allied logisticians, therefore, looked upon the flying bomb and the rocket as more of a nuisance than a serious threat to port operations. Part of their attitude stemmed from the fact that the V-1 campaign against London had just ended except for a few air launched flying bombs and the V-2 was not yet a major headache.

General Armstrong's command initially consisted of 11,500 men assigned to three antiaircraft brigades. The 56th antiaircraft brigade was commanded by American General George M. Bader and the 80th antiaircraft brigade was commanded by English General H.W. Deacon. The 50th antiaircraft brigade remained under General Armstrong's personal command. Several Polish antiaircraft batteries were also attached to the command, which was designated the "Anti-Flying Bomb Commando Antwerp X." Over the course of the campaign the number of men nearly doubled to 22,000 and at its height the defenses had 208 U.S. 90mm guns; 128 British 3.7" guns; 188 37mm and 40mm guns and 72 searchlights. The port of Antwerp was the center of a "critical zone" fourteen miles in diameter and it was the mission of the guns to keep the flying bombs out of this critical zone. Tactical doctrine called for the guns to be deployed ten miles from the zone so that crippled flying bomb could not glide into the zone after they were hit. Observers stationed on the approaches to the city reported targets to the two antiaircraft operations rooms which alerted the gun sites located along the flight path of the target. The three antiaircraft brigades were designated solely for defense against V-1s and in order to keep their positions as secret as possible, all commanders and gun crews were strictly forbidden from firing at German aircraft to avoid revealing their locations. The defenders and their advisory team had little time to prepare and work went forward at a rapid pace. The initial deployment of the defenses was established on October 28, 1944. The guns were placed in an arc facing roughly southeast from 90° to 124°. From left to right were the British Heavy Anti-aircraft Regiment (

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3.7" guns); the U.S. 740th Anti-aircraft Artillery (AAA) Gun Battalion (90mm guns); the U.S. 126th AAA Gun Battalion; the 73rd British Light AA Regiment (37mm guns); and the U.S. 126th AAA Gun Battalion. Like the experience with London, the defense was initially hampered by restrictions designed to protect friendly aircraft taking off from and landing on any one of the numerous airfield surrounding Antwerp. Until November 5, the gunners of Antwerp X were restricted to firing at targets that could be visually identified as V-1s. Due to the restrictions and inclement weather, the defense brought down very few flying bombs. After the rather poor initial showing, Headquarters Antwerp X established an Inner Artillery Zone that included the lanes of approach of the flying bombs and the defensive area itself. Aircraft were instructed to stay out of this area, but friendly aircraft frequently violated the ban. In the two week period from November 26 to December 11, 1944 a total of 357 friendly aircraft entered the zone.

On November 10, 1945 all British units except the 42nd Searchlight Regiment were withdrawn from the defense and the line was thickened by additional U.S. gun battalions with their center facing 125°. From left to right were the 740th; 184th; 126th; 125th; 407th; 405th; and 494th AAA Gun Battalions. Forward of the main line were the 789th and 788th Automatic Weapons (AW) Battalions armed with the 40mm anti-aircraft gun. Throughout the campaign the 40mm were used but they were only marginally effective. The flying bomb's steel fuselage and limited number of vulnerable spots meant that the 40mm gunners had to score a direct hit to bring it down. On December 6, an eighth gun battalion was added to the main defensive belt and four additional gun battalions were deployed forward of the main belt. The AW battalions were pulled behind the main belt and reinforced with another battalion. This was the beginning of a trend much different from the defenses of London. The V-1s were coming in along narrow corridors with little deviation so the defenses were gradually arranged in depth along the corridors. Flying bombs which were obviously not going to hit Antwerp were called "flankers" and were not fired upon. On December 15, in conjunction with the Ardennes Offensive, the Germans began firing V-1s from Holland. The flying bombs began arriving from roughly 60° from the city effectively outflanking the defenses. Due to the emergency caused by the offensive there were no gun battalions to spare so the existing ones were spread in an arc between 50° and 75°. The main belt consisted of six battalions backed up by one AW battalion covering about three times its normal area. The original V-1 route was covered by a forward belt of two gun battalions and a main belt of four gun battalions, backed up by two AW battalions. As if the battle against the flying bombs was not enough, the gun crews were also organized as infantry battalions and had to pull extra duty at road blocks in case there was a German breakthrough. As the German offensive reached its peak, five gun battalions and all the AW battalions were withdrawn from Antwerp X, leaving four gun battalions covering the northern route. The southeastern approaches were reinforced by the British 98th Heavy AA Regiment and the 296th Light AA regiment. The units were deployed so that there were two units in the forward belt and three in the main belt with the Light AA regiment backing up the main belt.

By January 11, 1945 the German offensive had been blunted and the guns were recalled. The V-1 attack from Holland reached serious proportions since the volume of fire was heavy and

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the bombs deviated less from their course because the range was so short, in some cases less than 60 miles. The southeastern defenses were thinned and the northeastern defenses became very narrow with four belts of heavy guns, consisting eight U.S. gun battalions, one partial British 3.7" battalion and one AW battalion. In the last week of January, Wachtel's troops began launching nearly due south from the area of Rotterdam. A major complication for the defense was Airfield B79, one of the largest on the continent located due north of Antwerp and directly under the path of the newly directed incoming V-1s. With the flying bombs coming in at low altitude and anti-aircraft shells exploding near the runways and approaches, the airfield could no longer be used safely so it was closed and moved. By January 31, the new approach was covered by one U.S. gun battalion and one British heavy AA regiment, backed up by two AW batteries. The northeastern approach had been thinned to four belts consisting of six gun battalions and two AW batteries. The southeastern defenses consisted of five heavy gun units, one of which was British and one AW battalion. A month later, V-1 attacks increased to the point that the defenses had to be reinforced once again. On February 28 the guns were deployed in a double belt stretching from due north to due east. There were five U.S. gun battalions and a British Heavy AA regiment in the forward belt and three U.S. gun battalions and a British Heavy AA regiment in the second. Along the northern route were two AW battalions and a gun battalion arranged one behind the other. A gun battalion was deployed forward of the main belts at 20° and a U.S. gun battalion and a British Heavy AA regiment were placed side-by-side at 54°. The southeastern belt had been thinned to a British Heavy AA regiment; one AW battalion and a U.S. gun battalion arranged in that order. The defenses remained in that configuration until the flying bombs stopped falling after March 30.

The equipment of the units in Antwerp X was some of the finest in the world. Even so, there were serious obstacles to overcome. The conditions in Belgium and Holland were less than ideal for the S.C.R. 584 radar and presented radar officers Major Victor Rabbe of the 50th AAA Brigade and Major Claude Parish of the 56th AAA Brigade with considerable difficulty. The V-1 presented a smaller "pip," as radar sightings were called in World War Two, than fighter aircraft. To the experienced radar operator a V-1 could be further distinguished by its straight and level flight path. Occasionally, Typhoons and Spitfires were mistaken for V-1s as they used a straight and level approach to land at the numerous airfields surrounding Antwerp. Another problem was the terrain. The ground was flat and wet and dotted with numerous villages with tall steeples and chimneys. The combination caused a lot of ground clutter and when they could, the radar officers stationed their sets behind one of the local pine woods that dotted the landscape to mask the villages and reduce the clutter. The radar sets along the northern route had a particularly difficult time because of water and windmills. Since there were few woods, the radar crews set up wire fences 50 yards in front of the sets and this also served to mask the clutter.

When controlled by the SCR 584 radar set, the U.S. 90mm M1 Anti-aircraft Gun was the finest anti-aircraft gun of World War Two. During the campaign they operated 22 hours a day with two hours a day for maintenance. Like every other mechanical device, the gun wore out after prolonged use. The life expectancy of the gun tube was 1,500 to 2,000 rounds and many

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batteries wore out three or four sets of tubes over the course of the campaign. After the third wore out, the gun slide had to be replaced as well. Due to shortages of replacement barrels some tubes were retained until they fired as many as 2,500 rounds but this was a dangerous practice. When the tube became that worn, muzzle velocity grew erratic and, in some cases, the lands in the tube began to peel. For much of the four months of December 1944 to March 1945, nearly every 90mm anti-aircraft gun barrel produced was sent to Antwerp. The anti-aircraft units in the Pacific and the Mediterranean had to wait. In February ammunition ran low despite emergency deliveries by air. The M-13 fuze-setter and the hydraulic rammer were considered problems. In the case of the latter many gun crews resorted to ramming by hand, a practice many a section chief maintained was better than hydraulic ramming anyway.

Because of the short flight times and low altitude of the approaching V-1s, aircraft could not be used to intercept them the same way they did in England. Nevertheless, aircraft played a major role in countering the V-1. The V-1 attacks were supported by a specially equipped He-111 spotter aircraft that flew over Antwerp on a nightly basis. The allies believed the aircraft was equipped with a powerful guidance beacon that directed the V-1s to their target in the city and then used a “cut off” beam to activate the flying bombs’ diving mechanisms at the right moment.¹⁰ The Allies also suspected guidance beacons from the transmitter at Bonn-Hangelar and a new site built just east of the Rhine were guiding flying bombs onto their targets, but neither of these suppositions proved to be true. It was a logical consequence of the increased accuracy of the flying bomb due to the short range from the launch sites in Holland to Antwerp. In late October, General Cameron asked that aircraft be assigned to help destroy the flying bomb threat. The request was approved by SHAEF Headquarters in early November and the British 2nd Tactical Air Force was instructed to form a wing of fighters to deal with the V-1 threat. Since there was so little time to detect them and shoot them down, the only way aircraft could interdict the flying bombs was to destroy them before they were launched. The original wing was augmented by twelve squadrons of No. 12 Group’s Spitfires assigned to Air Defense Great Britain. These squadrons were based at Matson in England and on good flying days they would leave Matson in the early morning and fly to the 2nd TAF airfield at Ursel in Belgium. These fighters hunted for V-1 sites during the day and returned to England at night.¹¹ The system gave the Allies a tremendous increase in the number aircraft searching for V-1 launch sites. As in France the first attacks were against the launch sites, but these were mostly unsuccessful. The new launch sites had a smaller signature than the modified sites in France and they were far more difficult to find and hit. Even when the sites were hit, there was little in them to damage or destroy and minor damage could be repaired very quickly. The Allied command then decided to stop the launches by attacking the rail net that was supplying the sites. Consequently, the aircraft of No.12 Group began fighter bomber raids against the railroad lines and sidings that might be supplying the sites. These aircraft, carrying 250 and 500-pound bombs proved quite effective at cutting the rail lines.¹² The Germans countered the rail line attacks by forming railway repair gangs in the various towns and villages along the line. Each gang was assigned a section of track to repair in the event it was damaged. This system of repair proved particularly effective and although rail traffic was disrupted during the day, the tracks were quickly repaired during hours of darkness.

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There was no respite for either side at night. Many V-1 launches were made at night for the double purpose of avoiding detection of the sites by Allied aircraft and making more difficult for Allied aircraft to shoot them down. What the Germans could not know was that many of the Allied gunners the V-1 was a much easier target to track at night. The Allies took advantage of their excellent night fighters and assigned the destruction of V-1s as a secondary mission to the 422nd and 425th Night Fighter Squadron. These two squadrons flew the Northrop P-61 Black Widow night fighter. As with the fighters of Air Defence Great Britain, the Black Widow found the V-1 a difficult target because it flew at roughly the same speed as the night fighter which made closing on a flying bomb ahead of the aircraft nearly impossible. The short flying time of the V-1s to their target and their low altitude made interception nearly impossible so the night fighters also turned to interdiction missions with rail as the primary target. Flying over the area at night, Northrop P-61 Black Widow Nightfighters of the 422nd and 425th Night Fighter Squadron attacked the rail lines east of Bastogne during December. During the period from 16-27 December the 425th Night Fighter Squadron destroyed three locomotives and 16 rail cars during night ground interdiction missions.¹³ Despite the allied efforts to interdict the German transportation system, V-1 launches continued.

During the nearly six months of the campaign to defend Antwerp, the personnel of Antwerp X were called upon to perform under exacting conditions, not to mention the danger of being hit by a V-1 or V-2. Army Tables of Organization didn't provide for crews that allowed 24 hour a day operation so the existing crews had to operate short handed round-the-clock. In the 175 days of the campaign, they had 32 soldiers killed and 289 wounded. What they accomplished was the downing of 2,183 V-1s. In one week near the end of the campaign, they succeeded in shooting down 94% of the incoming V-1s. To accomplish this, they expended 532,000 rounds of 90mm ammunition, used 3,255,000 sandbags, 1,000,000 gallons of gasoline and over 4,250 tons of coal. Like Pile's gunners defending London, they could not keep them all out and every flying bomb that got through was a potential disaster. For the entire campaign the Allies logged 4,248 V-1s falling in the vicinity of greater Antwerp which meant that flying bombs were hitting the city every day excluding the six days in December when 5th Flak Division suspended firing for faulty elevators and March 17, 1945 when no V-1s fell on Antwerp. Two hundred eleven got through to the critical area. Of those 150 actually hit the dock area.

The first V-2 hit the city on October 7 and the first V-1 was recorded on October 11, ten days before the campaign ordered by Hitler began. The first serious incident in the city occurred when a V-2 slammed into Schilderstraat at 9:40 A.M. on October 13, more than a month before the Allies cleared the port. Thirty people were killed and forty-five injured. The intelligence report for the British 7th Armored Division on the following day stated tersely "...something beastly fell in Antwerp yesterday."¹⁴ There were three more serious incidents before the end of October. A V-2 that fell in Kroonstraat on October 19, killed 44 and injured 98. A week later a V-1 fell in Tuinbouwstraat killing 30. Two days later, a V-2 hit Bontemantelstraat killing 71 and wounding 80. Just these four incidents accounted for a total of 177 dead and 226 seriously

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injured. The new anti-aircraft defenses were barely in place when the heavy V-1 bombardment began on 21 October. Other cities such as Ghent and Brussels were also targeted. Ghent escaped serious damage but fifty-five flying bombs landed in Brussels in a four day period causing considerable damage and frightening the inhabitants. Antwerp was destined to take the brunt of the bombardment. By October 25 a total of 79 flying bombs had been launched. By the end of the month the number rose rapidly to 337. These attacks proved very effective both in terms of damage done and as a device to range the various cities for concentrated attacks by the various launch sites. While the launch crews proved they could hit any of a number of cities, Colonel Walter knew the most important target was Antwerp and after the initial ranging attacks began a sustained bombardment of the crucial port city.

Throughout November an increased number of V-weapons hit the city and the port. There were at least six incidents in which thirty or more people were killed. On November 11 a V-2 fell in Broydelstraat killing fifty one and severely injuring sixty two. Among these were some of the first military casualties. Fifteen soldiers were dead and six wounded. On November 13, 1944, even before the port opened, ComZ Headquarters issued Passive Air Defense (PAD) instructions for both soldiers and civilians working in the port area. They included directions for staying away from windows, taking cover and not looking out windows to see the V-1s as they passed over. Less than a month later, the defenses were increased. Perhaps the most tragic incident of the period occurred when a V-1 slammed into the Boy's Orphanage on Durlletstraat at 1115 hours on November 16. Thirty six were killed and 125 injured, many of them children. The 350th Dispensary was one of the U.S. units that assisted in the disaster and was destined to play a major role in many of the flying bomb and rocket incidents. It helped evacuate many of the injured despite the fact the ruins of the orphanage were in danger of collapsing. Several Belgian Agencies, including the Belgian Red Cross praised their efforts. The report of the Chief of Transportation of the E.T.O. the following month said, "The heroic rescue and first aid work done by the officers and enlisted men of the 350th Dispensary during December was outstanding. Working with the Belgian Red Cross, at their request, the (sic) answered calls for help any hour of the day and night. They treated civilians and military personnel at the scene of V-bomb hits and moved victims to the dispensary. Many times they were called from one such distress to another. They also carried out their mission of providing medical aid for approximately 4500 troops of the U.S. Army, Navy and civilian employees of the U.S. Government." ¹⁵ Of the 3 officers and seventeen enlisted men in the 350th Dispensary, 2 officers and 11 enlisted men were wounded in the course of the campaign. Two of these were wounded when their billets were flattened by a V-1 in December 29. The day before port operations began a V-2 hit at Kerserlei & Meir killing 128 of which 26 were military. One hundred and thirteen soldiers were injured. On December 7, 1944 the PAD instructions became more comprehensive when headquarters instituted siren warnings in the port. A single 30 second wail indicated a flying bomb attacks and two 30 second wails separated by 5 seconds was a conventional air raid. For conventional raids, workers were to lower their loads and find cover. For V-1 attacks they were instructed to find cover immediately.

The incidents in November were not allowed to interfere with discharge operations. In the

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first week, the Americans were well on their way to achieving their goal, unloading 10,000 tons of cargo per day. The 13th major Port was reinforced by the 5th Major Port at the end of November and the discharge rate climbed to roughly 19,000 tons a day in the first week in December. From that point there was a steady decline in productivity. Sometime after the port opened, logistical planners revised their estimates of the port's capabilities downward. They expected the U.S. side of the port to discharge 15,000 tons per day in December 21,500 tons per day in January and 22,500 tons per day in March. The target tonnage was lowered again in December to 16,000 tons per day in January; 18,000 tons per day in February; and 17, 775 per day in March.¹⁶ In the third week of December, the actual daily discharge rate fell to 13,700 tons per day. This was slightly more than 60% of the target goal and only 91% of the new goal. In Volume II of *Logistical Support of the Armies*, Roland G. Ruppenthal attributed the slow down in discharge rate to the lack of port clearance capability, particularly the lack of rail cars.¹⁷ The shortage was caused by the amount of cargo loaded on some 35,000 cars in Liege and Luxembourg City ready for evacuation in the face of the advancing Germans during their December counter-offensive. Another reason Ruppenthal gives for port congestion was the embargo on shipments to forward depots during the Battle of the Bulge. Cargo was not shipped to Liege and Luxembourg City because of concern they might be captured by the advancing Germans.¹⁸ For the short time cargo was unloaded during November and early December, the port clearance rate was 50% which meant that the authorities in the port were storing one ton of cargo for every two tons discharged. The rate of clearance subsequently improved, so that by the end of the month "there was an excess of forwardings over tonnages discharged."¹⁹ The increase was so marked that the average discharge for the month of December was 73%. In January the average rose to 92%. One reason for the increase in port clearance was the "ABC Haul" created by U.S. transportation authorities specifically to clear cargo from the port. Named ABC for Antwerp-Brussels-Charleroi, it involved an average of 16 truck companies, most of them equipped with 5 ton tractors pulling 10 ton semi-trailers. The ABC began on November 30, 1944 and ran until March 26, 1945, during which time it hauled 245,000 tons of cargo from Antwerp.²⁰ Two of the truck companies were used specifically for pier clearance within the port. In February port clearance rose to 113.6% as the backlog was being cleared. Even then the ship discharge rate did not reach 22,500 tons a day. Since the planned discharge rate was less than 25% of Antwerp's actual discharge capacity in order to insure that the port was not congested by backlogs, it is evident from these statistics that port clearance was not the main reason for the drop in the discharge rate. What was holding up the productivity of the port was the German bombardment with the V-1 and V-2.

In addition to the port discharge rates, the German bombardment also affected rail and barge traffic. Rail traffic problems were caused to a great degree by hits on rail lines, bridges and rolling stock by flying bombs and rockets, as this excerpt from a report from the 2nd Military Railway Service for the period 15 to 30 November shows:

"The German robots are doing considerable damage to rail facilities in Belgium, particularly in the Antwerp and Liege areas, which is being further aggravated by the fact that

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Belgian workers are refusing to work in these areas. A considerable number of trains have been held up waiting for repair of track in order to get through the Liege area. The Military Railway Service is coping with this situation as expeditiously as possible; however, the additional help of Belgian labor is urgently needed to speed up the flow of traffic." ²¹

The situation was no better in December as this report dated January 3, 1945 shows:

"The month of December represented for the 2nd MRS a period of continued change, reaching a peak in tonnage handled, followed by a sharp downward trend brought about by the tactical situation , bombing and strafing of installations and trains on the move, losses in equipment and personnel due to the offensive of the enemy in Belgium, and *increased activities in attacks by V-1 and V-2 flying bombs.*"(authors' italics) ²²

The north yards in Antwerp were manned by American rail units that were normally considered "rear area" personnel yet many units suffered a considerable number of casualties. The 729th Railway Operating Battalion listed 28 Purple hearts awarded for wounds and the 743rd Railway Operating Battalion listed 68 personnel wounded, three of them twice. Barge traffic was initially a problem because the Albert Canal remained blocked by the remains of the Yserburg Bridge until December 23. This was mitigated to a certain extent by trucks hauling cargo from the piers to a spot beyond the blockage and loading the barge from there. Even after the canal was cleared barge traffic from Antwerp never reach its potential and the logisitcal chain of command was happy about it. The reasons were summed up in this report from March 1945.

"Mid-February saw Antwerp visited by the Commanding General, Com Z who was not pleased with the barge situation. In assisting to prepare an answer to his report, Movements gave the revised program for Inland Waterways and an explanation of how floods and civilians unwilling to work under buzz-bomb fire had hampered the previous one." ²³

From October 1944 to March 1945, the Germans maintained a bombardment of the City and Port of Antwerp that lasted 175 days. During that time the only day on which no V-weapon fell on the port was March 17, 1945. By the end of December the number of V-1 launches against Antwerp rose to 924 ²⁴ Just less than half that number slammed into the city and port area, many landing within a few hundred yards of their aiming point. The damage and casualties grew rapidly. By the end of the year more than 1,000 homes had been destroyed, and more than 13,000 were heavily damaged. An estimated 1,500 civilian residents of Antwerp and its suburbs were dead as a direct result of the V-1s and thousands of others had been wounded. The Allies recorded a total of 4248 V-1s and 1712 V-2s falling in the Greater Antwerp area and the west side of the Scheldt River. Of these, 150 V-1s and 152 V-2s actually fell with in the dock area. Another 47 V-1s and 31 V-2s fell north of the dock area between the docks and the city limits. Those falling in the dock area killed 53 military and 131 civilians and severely injured 174 military and 380 civilians. ²⁵ Damage within the dock area consisted of two warehouses

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destroyed; twenty berths damaged; a canal lock damaged; a 150 ton floating crane sunk by a direct hit from a V-2; and 150 ships either sunk or damaged by V-weapons. One of the warehouses took a direct hit that caused 148 casualties. Personnel were constantly diverted from discharge duties by an endless stream of warnings to take cover and by rescue and repair details. The damage did not have to be extensive to use up valuable labor and repairs to buildings and facilities was an on-going process. One report from the 13th and 5th Major Ports near the end of the war stated, "The rehabilitation of sheds and structures was carried out, and badly damaged buildings were repaired where possible. Because of the damage done by German V-1 and V-2 bombs, as well as by jet planes, it was necessary to keep crews at work repairing structures, roofs, doors, windows, and walls. About 90 percent of all glass in port installations was shattered and had to be replaced with plywood blinds of a temporary nature."²⁶ Close calls were frequent. One ABC driver stated, "We can really put out the stuff and the only difficulty we have is the with the buzz bombs. They hardly ever interfere (sic) with our operations but they are a *constant nervous strain* (authors' italics). The closest bomb I ever came to was when driving from the [Antwerp] marshaling yard to the port area. A buzz bomb hit an old factory along the route about a hundred yards in front of me. It caved in the whole roof and walls of the factory and littered the streets with debris. Some civilians were killed and other (sic) were injured but none of our drivers were injured and we had to reroute temporarily until the street was cleared off with a bulldozer."²⁷ The constant "nervous strain" is a common theme among first person accounts of life in Antwerp and Liege during the period. Many G.I.s simply referred to Antwerp as the "city of sudden death."²⁸ Units outside of Antwerp found themselves the targets of V-1s that overshot the city. On November 11, the headquarters of the 709th Railway Grand Division arrived in Malines to discover their quarters had been destroyed by a V-1. It took them two days to find another place which had been damaged by V-1s exploding nearby. The first ship hit by fragments from a V-2 was the *Timothy Bloodworth*, operated by the Lykes Brothers Steamship Company. On December 24, 1944 a V-2 disintegrated in an air burst overhead causing no damage whatsoever. A second V-weapon, probably a V-1 hit nearby and caused slight splinter damage on the hull near the number one hold. No one was hurt²⁹

The bombardment made conditions in the port so dangerous that concerns about bringing ammunition into the port was raised by Supreme Headquarters as early as November. SHAEF requested the headquarters involved to present their views regarding the subject. The Communications Zone (COMZ or ComZ) "recommended that ammunition be excluded entirely, and proposed that all Class V [ammunition and explosives] continue to be handled at Cherbourg and Le Havre."³⁰ The Allied naval command and the British 21st Army Group felt that ammunition ships could be brought into the port if their numbers were strictly limited and they were adequately dispersed. The policy laid down by the chief administrative officer of the port a few days later did not forbid ammunition ships in the port but restricted the quantity to operational requirements "at the discretion of Communications Zone and 21st Army Group, and specified that it be handled in a separate and remote section of the port, that no dumps be permitted even for sorting, and that special fire fighting preparations be made."³¹ However, shortly after the port opened the port Executive Committee asked that all ammunition ships be

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temporarily excluded from Antwerp, a request approved by SHAEF Headquarters with the provision that no ammunition would be brought into the port for the next fourteen days. An exception was soon granted to admit a few British ammunition vessels, but this did not become standard practice. Ammunition did come into Antwerp on a regular basis, but it was primarily anti-aircraft ammunition for the guns defending the city and the port. "Because the danger from constant bombardment by V-bombs forbade it, not many shiploads of ammunition came through the port. However, on several occasions a total of 3,000 tons of ammunition cargo consigned to other depots were diverted to the AAA batteries defending the Antwerp area. Trucks were rushed to the ship's, (sic) loaded with the needed ammunition and driven to the gun emplacements directly for distribution."^{31.1} Most of the ammunition for the theater had to be transported the 500 miles from Cherbourg or 275 miles from Le Havre by rail and by truck, using up additional fuel and resources.

On January 1, 1945 at twelve minutes past midnight, a V-2 fell in Burgerhout killing 46, one of them military and wounding 33 civilians. A week later on January 8, a V-2 hit pier 123 about fifty yards from the freighter *Blenhiem* operated by the Waterman Steamship Company. "The concussion cracked all the bulkheads in the cabins and the forecastle, blew off or damaged all the doors, broke water pipes, and ripped radiators and bunks from the bulkheads."³² The blast injured twenty of those on board and the ship needed nearly a month to make temporary repairs. She finally left for England in a convoy on February 2. Less than a week after the *Blenheim* was damaged, a V-2 hit berth 218 near the starboard quarter of the *Michael De Kovats* damaging the superstructure and causing blast damage below. The explosion injured three aboard the ship and reportedly killed a soldier on the pier.³³

The citizens of Antwerp suffered the same agony as the citizens of London but they lacked one advantage of their English allies. There were no subways or deep shelters because Antwerp rests only a few feet above sea level. One of the unique problems facing the Belgian authorities as well as the Allies was getting Belgian civilians to work in areas under V-weapon bombardment. In Liege the Belgian government offered civil servants a form of "hostile fire" pay and in Antwerp municipal authorities offered a 25% pay differential for personnel working in the dock area. The additional pay worked but it also led to disputes because it was paid only in certain zones or areas and the V-weapons were so inaccurate many were bound to stray outside the designated zones causing additional workers to demand the higher pay rates. As the Germans increased the rate of fire for both V-weapons the casualty rate in the city climbed. There was at least one incident per week in which at least thirty people were killed by a single bomb in October. In November it climbed to 1.5 of these per week and in December the rate of serious incidents climbed to nearly 2 per week. On December 16 the Cinema Rex in downtown Antwerp was crowded with soldiers, sailors, civilians and merchant marine crews seeking some relaxation from the tension of living under the V-weapon bombardment when a V-2 scored a direct hit on the theater. Five hundred sixty seven people were killed and 291 seriously injured. It was the worst single V-weapon disaster of the entire war. Numerous units were called in to help remove the bodies and treat the few survivors. Among these were the 350th Dispensary and the 358th

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Engineer General Service Regiment that had already suffered casualties from V-weapon hits in the port. It took 5 days to recover all of the bodies and after the incident all the theaters in Antwerp were shut down and large public gatherings prohibited. By the time the German bombardment ended in March 1945, 3,752 civilians had been killed and 6,072 severely injured.

Even before the V-weapons began taking their toll, the Army's Operations Division in Washington began to have serious doubts about relying so heavily on Antwerp. With the restrictions placed on ammunition entering Antwerp plans were made to activate Ghent as a "stand-by" port for Antwerp. In January 1945, Ghent was opened under joint American and British control. Since it had been used by the Germans only for barge traffic, the port had to be dredged and many facilities repaired and rehabilitated. The 1080th Dredging Crew aboard the U.S. Army hopper dredge *W.L. Marshall*, were veterans of dredging along the Scheldt and had several doors blown off the dredge by near misses from V-1s and V-2s. The U.S. 17th Port was assigned to Ghent and on January 23, the Liberty Ship *Hannis Taylor* berthed in the port and began unloading. Ghent rapidly increased in volume and brought in ammunition, the authorities declined to bring into Antwerp. The chart below shows the actual and planned discharge tonnages for Antwerp and Ghent for the period December 1944 through March 1945. For the entire period that Antwerp was under bombardment, the ship discharge rate was roughly a third less than that originally planned. The chart below shows the theater total tonnages minus POL discharged from December 1944 through March 1945; the planned discharged tonnages, the actual discharged tonnages and the percentages of the entire theater.

DISCHARGE TONNAGES ³⁴

Month	Theater Total	Antwerp Planned	Antwerp Planned %	Antwerp Actual	Antwerp Actual %	Ghent Tons	Ghent %
Dec 44	1,555,819	697,500	44.83	427,592	27.48	0	0
Jan 45	1,501,269	697,500	46.46	433,094	28.84	15,742	1.04
Feb 45	1,735,502	630,000	36.30	473,463	27.28	69,698	4.01
Mar 45	2,039,778	697,500	34.19	558,066	27.40	172,259	8.44

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The planned monthly discharge rates were lowered to 496,000 tons in January 1945; 504,000 in February; and 551,025 in March.³⁵ The port was unable to achieve these modest goals.

Antwerp was not the only Allied logistical target on the Continent taken under bombardment by the Germans. The situation on the Western Front in November 1944 did not allow Germany the luxury of using the V-weapons exclusively to bombard Antwerp and London. The acute shortage of German artillery on the Western Front demanded that Wachtel's units be used to support the battle. They were first used to fire at Liege which was a U.S. Army supply, rail and communication center. General Hans Krebs requested of OB West that the V-1 be used to support Heeresgruppe B (Army Group B) to provide some relief to the army group. Von Rundstedt's headquarters then ordered 5th Flak Division to fire on Liege even at the expense of the campaign against Antwerp. Wachtel accordingly ordered six launchers in the Netherlands to fire with one of his usual exhortations to provide "relief of our army comrades who are involved in very fierce fights. I therefore demand non-stop firing from all technically-serviceable sites against the enemy supply center at Liege."³⁶ The U.S. 708th Railway Grand Division which had its headquarters in the main railway station in the city was about to become intimately familiar with the V-1. "On 20 November in the early afternoon, the sky suddenly cleared and exposed the sun for a few minutes. Operations at Ans, Renory and Kinkempois Yard and Guillemins were routine. At 1525 hours the sound of an approaching V-1 was scarcely noticed except by a few who chanced a casual skyward glance endeavoring to spot the flaming robot in its trajectory over the city. Heretofore an occasional V-1 had pathed the sky always carrying its guttural '6X6- like roar' out of the sound of hearing. But the sound of this V-1 grew louder and louder and finally it stopped all together. In an instant its explosion rocked Guillemins valley. Some said it was an accident. But five minutes later there was a repetition; two more had fallen on Liege. The first robomb siege of Liege was on. The activity intensified by the hour and by the next day V-1's (sic) fell with severe regularity. A tabulation from 22 November to 30 November indicated 331 robombs fell and detonated in the almost immediate vicinity of the Liege (Guillemins) railroad station. Several hits caused damage (none of which was unrepairable) to railroad installations, including track damage, damage to the switch control tower at Guillemins and damage to the bridge leading the roundhouse at Guillemins. There was considerable damage to headquarters building."³⁷ Glass in numerous buildings was shattered and the troops began sleeping in shelters.

On November 22, several V-1s also hit the city of Liege. In one particularly tragic incident, a descending flying bomb ricocheted off the top of a trolley and hit the upper floors of a girls' school killing 36 and injuring many more. The 708th set up a warning system of personnel who listened for the sound of approaching flying bombs. No building or facility was safe. Two days after a V-1 hit the girls' school one hit the 15th General Hospital killing 12 and injuring 15. The following day a V-1 exploded in the underpass at the rear of the Guillemins engine shop damaging the track and the bridge. Trains were delayed for four hours. The "first siege of Liege"

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as it was called by the men of the 708th RGD, ended on November 30 at 1630 hours. The second began on December 15 when the Germans began their counter offensive in the Ardennes. In addition, Luftwaffe bombers made an unwelcome appearance. The rail yards were under constant bombardment. On December 17, a V-1 hit the Quartermaster fuel depot in Liege and blew up 400,000 gallons of gasoline³⁸ At 6:10 AM on December 21 a V-1 hit freight cars in Guillemins Station about 150 yards from the 708th RGD headquarters. It demolished or damaged 14 and set fire to at least six more. Since some of the burning cars held mail from home everyone assisted in unloading the precious cargo before it was consumed. The day after Christmas the 28th General Hospital took a hit from a V-1. Ironically, the only person killed was a German PW, but many of the frontline troops who were patients at the hospital asked to return to duty because they felt they were just sitting ducks in Liege. On December 27 Company B of the 740th Railway Battalion had eight killed and twenty injured when a V-1 struck their boarding cars on Renory Siding in Kinkempois Rail Yard. Some of the men were in the boarding cars because the houses in which they were staying had been damaged by a V-1. In the midst of all the turmoil two officers from a AAA battalion arrived to confirm they had shot down a V-1. The reaction of the men of the 740th can only be imagined. Flying bombs, V-2s and Luftwaffe bombs and strafing continued into the new year. On January 2, a V-2 hit hospital train at Liege demolishing 3 cars, damaging five more and shattering all the glass in another train. Another problem caused by both the V-weapons and the bombing by conventional aircraft was the frequent cutting of railroad signals. Without an efficient signaling system, it is impossible to run a modern railroad and the railroaders of the 2nd Military Railway Service and their Belgian workers found themselves constantly repairing lines to signals as well as telephone lines to keeps the trains operating safely. On January 11, 1945 a V-1 hit in the Kinkempois Yard tearing up 75 feet of track and making a crater 12 feet deep. Both main tracks were out all day.

Liege continued to suffer from the German V-weapons until they stopped all together. Major A.G. Gregory of the 708th Railway Grand Division lived through it.

“Mere words are highly inadequate to portray the terror and noise and death which all occur at the height of battle or bombing. In the two robomb sieges of Liege more than a thousand V-bombs fell and detonated in the city.”³⁹

“Nothing was untouched -- every aspect of life suffered. With great loss of life and untold human misery, civilian men, women and children and Allied military personnel were caught in the city of terror. Civilian and army hospitals, stores, dwellings, telephone offices, theaters and railroad yards all suffered direct hits. The V-1s traveling at high speed and with terrifying noise, would suddenly from a great height, cut off and dive into the city.”⁴⁰

By the end of the campaign against Liege, 92 soldiers had been killed and 336 wounded. There were 1,158 civilian casualties and 97% of the 82,700 dwellings in the Province of Liege were damaged or destroyed in this concentrated attack.⁴¹ In March 1945, the Chief of Transportation received the following report from Liege. "Most of the damage to supplies,

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transport equipment, and Transportation Corps personnel was from V1 and V2 bombs in the vicinity of Liege."⁴²

The V-weapons not only affected ports and railroads but also highway traffic. Roads were blocked and bridges were damaged. Wherever the drivers went within range of the weapons, they were in danger. One driver who lived through a V-2 explosion reported, "I had a double explosion rocket [typical of the V-2 breaking apart in the air] knock me off my truck. I was standing on the fender just getting ready to get in the cab when it went off. It was about a hundred yards away and killed a lot of civilians. You could see wood and everything flying high and in the air. They took me to an aid station but I didn't stay there long. As long as you don't get caught in the ring of concussion of the bombs you are O.K. One person can be two hundred yards away and get killed, another the same distance away on the other side will be safe. The rockets have not interfered with our operations except sometimes when we had to divert our route. *But they are a continuous nervous strain.*" (Authors' italics)⁴³

Fortunately for the Allies, the Germans had no idea of the kind of damage they were doing with in Antwerp and Liege. There was no intelligence network and no aerial photo reconnaissance.

Despite the inherent inaccuracy of both the V-1 and V-2, Hitler's decision to concentrate the continental weapons on Antwerp and Liege was essentially the correct one. From the end of November 1944 to the end of March 1945 the Germans were able to limit the amount of supplies brought into the port, particularly ammunition, in the face of Allied air superiority, thereby forcing the Allies to expend additional resources to accomplish the same task and forcing them to open an additional port at Ghent. The only saving grace for Antwerp was the fact that the cargo it discharged created additional space in Cherbourg and Le Havre for the additional ammunition the two ports had to handle. The 13th and 5th Major Ports and the civilian workers at Antwerp continued to discharge cargo under appalling conditions but the discharge rates reached neither the planned level nor the lower revised discharge rate until the V-weapons campaign was nearly over. By limiting Allied logistical activities in Antwerp and Liege, the German V-weapons demonstrated they could go a long way to compensate for the lack of a viable bomber force, but it was an effort for a war already lost.

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