

This was not all. Everywhere in front of and behind the lines artillery fire and bombing had pock-marked the ground with thousands of craters, and water-logged foxholes, dugouts, and abandoned gun emplacements added to the natural breeding grounds.

On 24 March the 11th Malaria Survey Unit arrived at Anzio to conduct a ground reconnaissance of the malaria problem. On 1 April a malaria control committee, consisting of American and British medical and combat officers, was established to co-ordinate all malaria control activity, and a school was opened at the beachhead in which 2011 officers and enlisted men drawn from every company and detachment on the beachhead were instructed in the means of combatting malaria. Emphasis was placed first on preventive measures which could be taken by the individual soldier such as use of headnets, mosquito bars, spraybombs, and insect repellents; secondly on large-scale drainage projects. Sixteen miles of stream drainage were completed by Corps engineers alone, while division engineers engaged in draining their own bivouac areas added additional miles to this figure. In those areas where the tactical situation prevented drainage projects the 42d Malaria Control Unit sent out dusting patrols, which dusted 107 miles of streams. The dusting program was carried right into no-man's land at night where static pools were sprayed. These prompt and vigorous measures produced amazing results. The 3d Division surgeon reported that not a single new case of malaria developed among replacements who came to his division on the beachhead from malaria-free bases. Yet the 3d Division occupied the sector of the beachhead most likely to produce new malaria cases.

4. *Artillery Action.* A major feature of the military activity on the Anzio beachhead was the unusually heavy concentration of German artillery. During the attacks of February German artillery was employed mostly in support of the enemy infantry; with the arrival of the period of stalemate its role became defensive. Most of the enemy artillery was moved from the central beachhead sector to better protected positions along the stream gullies between Ardea and Campoleone west of the Albano road. Medium and heavy guns switched to a program of harassing rear areas and counterbattery fire. A concentrated effort was made to neutralize the British field regiments around Sant'Anastasio and Corps artillery in the area Campomorto-Le Ferriere. The enemy counterbattery program comprised extensive counterbattery of gun positions, shelling of command posts to destroy wire and personnel, and local ground attacks to secure or neutralize our best artillery observation posts. Increasing enemy air attacks were made on our cub observation planes. In a war of position on such level, featureless terrain observation was at a premium, and it was vital to secure or deny that observation.

The second mission of enemy artillery was constant harassing of the vulnerable beach and port areas and of the trunk roads leading out of Anzio. For this the enemy employed 170-mm rifles with a range of 32,000 yards, 210-mm railway guns, and even 280-mm railway guns known to our troops as the Anzio Express. The amount of enemy shelling during March indicated that the Germans were not withholding ammunition for an assault but were taking advantage of their superior positions to inflict as heavy casualties as possible.

VI Corps artillery took elaborate measures to counter the enemy fire. A highly centralized Corps counterbattery system was developed. Beginning 6 March five enemy gun positions on each division front were selected daily and all available guns concentrated on it with time-on-target fire, three rounds per division gun, two rounds per Corps piece. This procedure was continued until all known enemy positions had been systematically fired upon. Enemy counterbattery was met by dispersion of guns and probable targets, digging in, careful concealment and camouflage of positions and observation posts, and the use of dummy positions. Quick warning of enemy aircraft was provided for the artillery observation planes, and "islands of safety" defended by anti-aircraft guns were established for them. P-40 and P-47 fighter-bombers bombed enemy gun positions with heavy 1000 and 500-pound bombs and clusters of 20-pound fragmentation bombs on every day suitable for flying. At the end of March the 194th Field Artillery Battalion (8-inch howitzers) was brought to the beachhead for the primary mission of demolishing houses used by the enemy as observation posts and strongpoints. Naval gunfire by cruisers and destroyers, using air observation, was also employed with good results. In April two 8-inch guns with a range of 35,000 yards and a battalion of 240-mm howitzers were dispatched to the beachhead.

5. *Supplying the Beachhead.* It was early evident that a greatly increased force would have to be maintained by sea at Anzio for a much longer period than originally anticipated. Consequently shipping schedules were revised for a protracted resupply, employing both truck-loaded LST's and Liberty ships. Convoys of LST's, which could dock directly in the port, were continued because poor weather delayed the unloading of Liberty ships by Dukw and LCT over the beaches. Starting 28 January, 300 trucks, loaded 50 to an LST, were dispatched daily, weather permitting, up the short 100-mile supply route from Naples. They were loaded with 1500 tons of 60% ammunition, 20% fuel, and 20% rations. Fifteen LCT's were also used to turn around weekly with supplies. Every 10 days 4 Liberties, loaded in North Africa, were to bring in 14 days' supply in order to build up a reserve stock at the beachhead. Since VI Corps was not equipped to handle supply functions, Fifth Army took over oper-

ation of the port and dump areas on 6 February. An advanced Army command post was set up at Anzio, primarily to administer these matters. The 540th Engineers took over operation of port and beaches, and their commanding officer, Col. George W. Marvin, became Port Commandant. On 2 February the Flag Officer, Western Italy, took charge of seaborne supply of the beachhead from Commander, Task Force 81.

With every part of the beachhead under enemy observation, artillery fire, and continual air raids, a unique situation prevailed at Anzio. The enemy shelling and air attacks placed a nervous strain on beach and dock personnel which reduced their efficiency an estimated 10%. Since ammunition and gasoline dumps were necessarily concentrated in a small, highly vulnerable area, fires and at first material damage were caused. Between 22 January and 10 March 1043.8 tons of ammunition had been lost by enemy bombing and 228.5 tons by artillery fire, an average of 27.7 tons per day. These losses, however, were at no time critical. Bulldozers and Italian labor were used to dig bunkers with loose dirt piled around on the edges to protect ammunition, and dispersal of supplies was enforced. The 16th Armored Engineer Battalion improvised an armored bulldozer by mounting a bulldozer blade on an M-4 tank. This device was used to smother fires in dumps by covering the burning piles with dirt from the revetments, gave protection to fire-fighting personnel, and cut down sharply the losses of ammunition. Corps counterbattery fire, increased air defenses, and bombing attacks on enemy gun positions all played an active part in reducing the effectiveness of enemy bombing and shelling.

By the end of January three serious shortages had developed at the beachhead: in ammunition, labor, and trucks. Owing to a general theater shortage and high expenditure of artillery ammunition by VI Corps there was an inadequate supply of some calibers. This problem was met by quota allotments of the scarce calibers and by building up of reserves. Lack of sufficient labor to clear and dig in dump areas was another problem. The Allied Military Government had evacuated some 18,000 Italians from the beachhead, and only about 750 able-bodied civilians were available for work. To alleviate this shortage Italian labor companies were brought up from Naples. Originally a port battalion was stationed at Anzio to unload Liberties. This method caused considerable lost time and fatigue because of the uncertainty of time of arrival of ships and the lack of accommodations or rations aboard ship for the port crews. About 1 March this difficulty was overcome by placing a port company with all necessary supplies aboard each Liberty ship at Naples, and having it return to Naples with the vessel. The opportunity of quickly leaving the dangerous Anzio area was an added incentive to rapid unloading. Under Army control port operation

also was made more efficient. Means were developed to improve the control of berthing of craft, to utilize Dukws and trucks more fully, and to systematize unloading and loading.

A critical shortage of LCT's to unload Liberty ships arose in early February. Most of these craft had been in service over a year without overhaul and were frequently breaking down. On 6 February only 15 were operational, although this was increased to 22 by 12 February. As a stopgap 10 to 20 LCI's were employed successfully for unloading. An attempt was also made to bring Liberty ships in close enough so that they could be unloaded directly by Dukw, but ship captains were reluctant to do so in the face of heavy shelling. Between 450 and 490 Dukws were in use at Anzio. The craft situation was greatly eased at the end of February when sufficient LCT's to supply the desired 5-per-ship again became available.

By the end of February supply problems had been largely solved. With improving weather and adequate craft for unloading, it was possible to discharge five and six Liberty ships at a time. As the weather improved and Dukws and LCT's could operate continuously, the proportion of supplies unloaded by Liberty ship greatly increased. By May six times as much was being unloaded from ships as from LST's. The peak month of March, when 158,274 long tons of supplies were discharged, proved the success of the system. On the high day of 29 March 7828 tons were discharged. Because of this tremendous build-up it was only necessary to unload 97,658 tons in April. Large reserves were also built up in anticipation of the resumption of the offensive by Fifth Army. Between 22 January and 1 June, when Fifth Army turned over the port to PBS after 131 days of operation, 523,358 long tons had been discharged at Anzio. Daily averages were:

	<i>tons</i>
January . . . . .	3616
February . . . . .	3441
March . . . . .	5106
April . . . . .	3255
May . . . . .	4242
Over-all Daily Average	3995

Owing to careful planning and efficient operation supply never became critical at Anzio, and ample reserves were built up for the successful breakout of the beachhead on 23 May. Far more supplies had been unloaded at Anzio than

originally expected, and the difficult problems of a protracted resupply of an exposed beachhead had been successfully met.

6. *Antiaircraft Protection.* With the establishment of the Anzio beachhead Fifth Army antiaircraft artillery faced its first major test in the Italian campaign. The German air force, which had confined itself after Salerno to sporadic harassing action, now launched its first planned, concerted air offensive since the Sicilian campaign. Troops and supplies concentrated in the small beachhead area and shipping crowding the roadsteads offshore offered ideal targets; disrupting the flow of supplies was of vital importance to the success of the enemy offensive to destroy the beachhead. The Second German Air Force, reduced by the departure of most of its medium bombers in late December, was quickly reinforced by Junkers 88's from Greece and Germany and supported by the antishipping bomber groups in south France. Allied air bases were over 100 miles south of the beachhead, and our planes found it difficult to counter the enemy's tactics of sneak raids and night attacks. To antiaircraft artillery fell a large share of the task of maintaining the flow of supplies and protecting key installations at the beachhead.

Enemy air raids, weak on D Day, increased sharply toward the end of January. At first the German fighter-bombers made cautious sneak raids in early morning or just before dusk. Junkers 88's from north Italy and torpedo and glider bombers from south France swooped in at dusk in low-level attacks on shipping. On 29 January, in the largest raid during the entire Italian campaign, a force of 60 followed by 50 more medium bombers sank an antiaircraft cruiser and a Liberty ship. Antiaircraft artillery attached to divisions and the 68th Coast Artillery Regiment (Antiaircraft), which was responsible for defense of the port, took a heavy toll of the Luftwaffe raiders, downing 38 and 10 probables in January alone.

Mounting craft losses and the threat of even heavier bombing raids led VI Corps and the navy to request urgently additional antiaircraft protection. The 35th Antiaircraft Artillery Brigade was attached to VI Corps on 5 February to command all antiaircraft defenses at Anzio, and Brig. Gen. Aaron A. Bradshaw, Jr., brigade commander, became Corps Antiaircraft Officer. By D plus 10 the 536th Antiaircraft Automatic Weapons Battalion had arrived; on D plus 11 the 216th Antiaircraft Gun Battalion closed at Anzio; and by D plus 15 the 433d and 451st Antiaircraft Automatic Weapons Battalions were sent up. Additional smoke-making apparatus, barrage balloons, and two British antiaircraft cruisers were also dispatched. Antiaircraft defenses were further strengthened during March and April by the arrival of 2 more gun battalions, giving a total at Anzio of 1051 guns of all calibers including 64 90-mm guns.

A carefully laid-out system of anti-aircraft protection, with guns sited to cover every part of the beachhead, was developed at Anzio. The backbone of the defense was formed by the 90-mm guns, emplaced in a great semicircle behind Anzio and Nettuno. These were supplemented by 40-mm guns and lighter weapons, which at night employed carefully controlled barrage fire to support the heavy weapons. A large part of the effectiveness of these defenses was due to the highly centralized control system, all fire being directed from a central gun operations room. To deter low-level attacks on shipping the 102d Anti-aircraft Balloon Battery flew up to 40 balloons over port and shipping. These balloons proved quite successful, although losses in the first five weeks, primarily due to bad weather, ran to 408%. Smoke, too, was effectively employed to screen the harbor one-half hour before sunset and thereafter on every red alert. The 24th Chemical Decontamination Company and later the 179th Chemical Smoke Generating Company set up a ring of smoke pots and Beseler smoke generators around the harbor area; supplemented by smoke generators on ships in the harbor, these used 5000 gallons of fog oil daily in making smoke. To prevent anti-aircraft and defending fighters from interfering with each other an Inner Artillery Zone of 12,000 yards' radius around the tip of the jetty at Anzio was forbidden to friendly aircraft. Enemy planes, finding the port defenses highly effective, turned to attacking gun positions and troops in forward areas with anti-personnel bombs. The German pilots discovered that if they came in below 1000 feet at night we could not employ 90-mm fire for fear of hitting our own troops. As an emergency measure to counter these low-level attacks a carefully controlled light anti-aircraft barrage was employed. The forward beachhead area was divided into three sectors, with two other sectors for the port and the Nettuno airstrip. As an enemy plane entered any one of these sectors the central gun operations room ordered a sector barrage, and 37-mm and 40-mm guns, each firing six rounds three seconds apart, blanketed the entire sector with fire. This barrage proved highly successful because of its careful layout and centralized control.

In the week beginning 16 February the German air force launched its strongest sustained air attack as part of the all-out offensive to reduce the beachhead. During 7 days the enemy made no less than 89 separate attacks, with a peak on 16 February of 172 planes. Under direction of the famous Colonel Pelz, who had planned the mass raids on London, every form of deception was employed to reduce the effectiveness of our defense. Decoys were used and simultaneous attacks made from many directions to confuse our radar. In coordination with the air attacks heavy 170-mm and 210-mm guns shelled the port area to drive our gunners to cover. In spite of these well planned efforts



*This quadruple-mounted gun waits for its fifth German victim.*



*The 90-mm gun (antiaircraft) was also used for ground fire at the Anzio beachhead.*



our anti-aircraft artillery and air force broke up the attacks, anti-aircraft artillery alone bringing down 25 planes and 23 probables in the 7 days.

During this critical week the enemy began using radar-jamming tactics to confuse our anti-aircraft and night-fighter radar. A powerful radio jammer was set up 14,000 yards behind the enemy lines, and there was evidence the enemy had learned the frequencies of our detecting equipment. More dangerous, the Germans began dropping "window," small strips of metallic paper which would be picked up and tracked on the radar while the raiders slipped through. Immediate steps were taken to meet this threat. The radar-jamming machine was located by triangulation and fighter-bombers effectively silenced it. General Bradshaw sent an urgent call to Algiers for the new, superior SCR-584 and SCR-545, which could not be jammed by window like the earlier SCR-268. Within 48 hours, under extreme pressure, crews were hastily trained in the new machines. By 24 February the first SCR-584's were in position. That night a flight of 12 Junkers 88's approached in close formation, using window. Forty-eight 90-mm guns, firing unseen by radar, caught them at extreme range over enemy territory and brought down 5 out of 12 with the first salvo. The remainder of the German planes jettisoned their bombs and fled. Use of the new radar sharply diminished enemy high-level night attacks. Searchlights could not be employed at Anzio for fear of enemy artillery fire so the SCR-584 and 545 were employed increasingly, even in daylight, with mounting success. By 31 March 90-mm guns, operating at extreme range with radar, had destroyed 22 unseen targets, and probably 24 more.

The 90-mm guns were also effectively employed for terrestrial fire, using experience gained on the Gustav Line. In the period 13-19 February, during the major enemy attack, these weapons fired 40 missions at up to 18,550 yards on enemy troops and installations. When a large concentration of enemy troops was seen moving down the Albano road on 17 February and every artillery piece available was called into action, 90-mm guns fired 1442 rounds of air-burst in 35 minutes and helped smother the attack.

Enemy air raids diminished during March with the abandonment of the offensive against the beachhead. Anxious to conserve its dwindling strength, reduced by heavy losses, the German air force employed more cautious tactics. Greater emphasis was placed on surprise, and expensive daylight raids were reduced in favor of night attacks. The enemy found that in every raid of over eight planes he invariably lost at least one, while small formations lost an average of only one plane in every four attacks. Consequently the enemy confined himself mostly to small-scale night nuisance raids. In the biggest raid, on 29 March, 20 Messerschmitt 109's provided top cover while 20 fighter-bombers

attacked shipping. Alert anti-aircraft crews shot down eight raiders, while Spitfires got seven more. By 2 April anti-aircraft artillery had shot down 157 planes and probably 100 more, an average of better than 2 per day.

Anti-aircraft artillery, in co-operation with the navy and air force, had broken the backbone of the only major German air effort in the Italian campaign. By 23 May, when the beachhead was finally broken, out of some 2500 German sorties our defending guns had shot down 204 planes and probably another 133. In morning raids anti-aircraft artillery destroyed an average of 30% and in some cases 45% of the raiding force. Our own losses from enemy action, although bound to occur in the crowded beachhead, had except in the earliest stage been kept remarkably small. This record had been achieved under constant enemy air bombardment and artillery fire. With an average strength of 10,796 anti-aircraft men at the beachhead, 574 casualties had been suffered by 27 May, but the flow of supplies into the beachhead had been maintained and the installations at Anzio effectively protected.