

# Operation Chastise

**Operation Chastise** was an attack on German dams carried out on 16–17 May 1943 by Royal Air Force No. 617 Squadron, subsequently publicised as the "Dam Busters",<sup>[1]</sup> using a specially developed "bouncing bomb" invented and developed by Barnes Wallis. The Möhne and Edersee Dams were breached, causing catastrophic flooding of the Ruhr valley and of villages in the Eder valley; the Sorpe Dam sustained only minor damage. Two hydroelectric power stations were destroyed and several more were damaged. Factories and mines were also either damaged or destroyed. An estimated 1,600 civilians drowned: about 600 Germans and 1,000 mainly Soviet forced-labourers. The damage was mitigated by rapid repairs by the Germans, but production did not completely return to normal until September.

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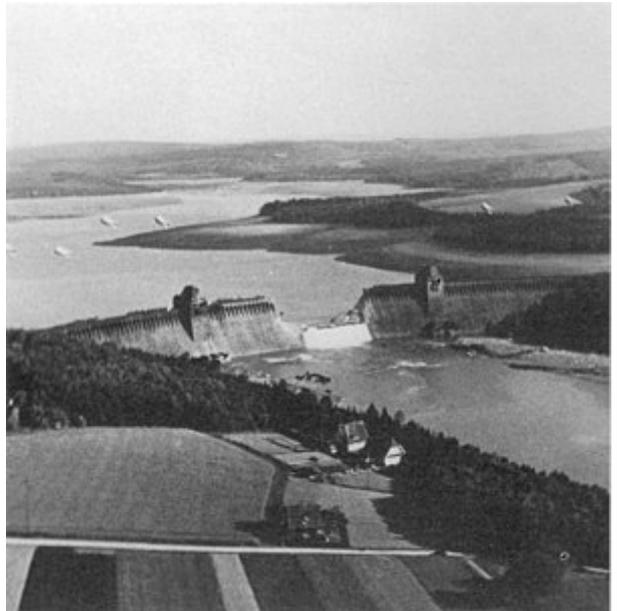
## Background

Before the Second World War, the British Air Ministry had identified Germany's heavily industrialised Ruhr Valley, and especially its dams, as important strategic targets: in addition to providing hydro-electric power and pure water for steel-making, they also supplied drinking water and water for the canal transport system. The methods used to attack the dams had been carefully worked out. Calculations indicated that repeated air strikes with large bombs could be effective, but required a degree of accuracy which Bomber Command had been unable to attain in the face of enemy defences.

## Concept

### Operation Chastise

Part of the Second World War



The Möhne dam the day following the attacks

<b>Date</b>	16–17 May 1943
<b>Location</b>	Eder, Möhne and Sorpe (Röhr) rivers, Germany
<b>Result</b>	British victory

### Belligerents

 United Kingdom
                         
  Germany

### Commanders and leaders

 Guy Gibson
                         
  Josef Kammhuber

### Strength

19 Lancaster bombers	XII. Fliegerkorps (Defending three dams)
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### Casualties and losses

8 aircraft shot down, 53 aircrew killed, 3 aircrew taken prisoner.	2 dams breached, 1 dam lightly damaged, approx. 1,600 civilians killed (including 1,000+ prisoners and forced labourers, mainly Soviet).
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The mission grew out of a concept for a bomb designed by Barnes Wallis, assistant chief designer at Vickers. Wallis had worked on the Vickers Wellesley and Vickers Wellington bombers. While working on the Vickers Windsor, he had also begun work, with support of the Admiralty, on a bomb designed initially for attacking ships, although dam destruction was soon considered.

Wallis's initial idea was to drop a 10 long tons (10 t) bomb from an altitude of about 40,000 ft (12,200 m). This idea was part of the earthquake bomb concept. At that time, no bomber aircraft was capable of flying at that altitude or carrying such a heavy payload. A much smaller explosive charge would suffice, if it exploded directly against the dam wall below the surface of the water, but the major German reservoir dams were protected by heavy torpedo nets to prevent just such an approach.

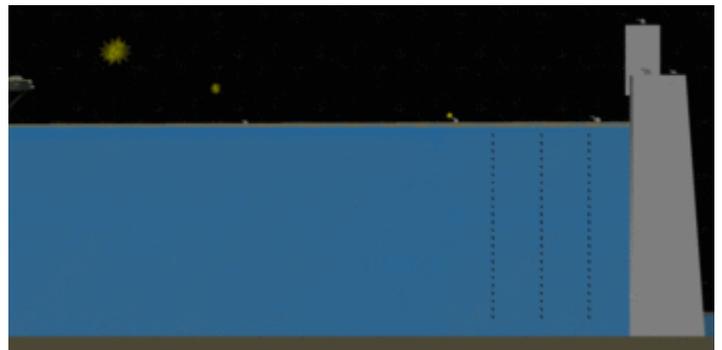
Wallis's breakthrough was to overcome this obstacle. A drum-shaped bomb—essentially a specially designed, heavy depth charge—spinning backwards at over 500 rpm, and dropped at a sufficiently low altitude at the correct speed and release point, would skip for a significant distance over the surface of the water in a series of bounces before reaching the dam wall. Its residual spin would run the bomb down the side of the dam toward its underwater base. Using a hydrostatic fuse, an accurate drop would bypass the dam's defences and then enable the bomb to explode against the dam some distance below the surface of the water

Initial testing of the concept included blowing up a plaster model dam at the Building Research Establishment, Watford in May 1942 and then the breaching of the disused Nant-y-Gro dam in Wales in July 1942. The first full-scale trials were at Chesil Beach in January 1943. This demonstrated that a bomb of sufficient size could be carried by an Avro Lancaster rather than waiting for a larger bomber such as the Windsor to be built. Air Vice-Marshal Francis Linnell at the Ministry of Aircraft Production thought the work was diverting Wallis from the development of the Windsor. Pressure from Linnell via the chairman of Vickers, Sir Charles Worthington Craven, caused Wallis to resign. Sir Arthur Harris, head of RAF Bomber Command from a briefing by Linnell also opposed the allocation of his bombers. Wallis had, however, written to an influential intelligence officer, Group Captain Frederick Winterbotham. Winterbotham ensured that the Chief of the Air Staff, Air Chief Marshal Charles Portal heard of the project. Portal saw the film of the Chesil Beach trials and was convinced.<sup>[2]</sup> Overriding Harris, Portal ordered on 26 February 1943 that thirty Lancasters were to be allocated to the mission and the target date was set for May, when water levels would be at their highest and breaches in the dams would cause the most damage. With eight weeks to go, the larger bomb, code-named 'Upkeep', that was needed for the mission, and the modifications to the Lancasters had yet to be designed.

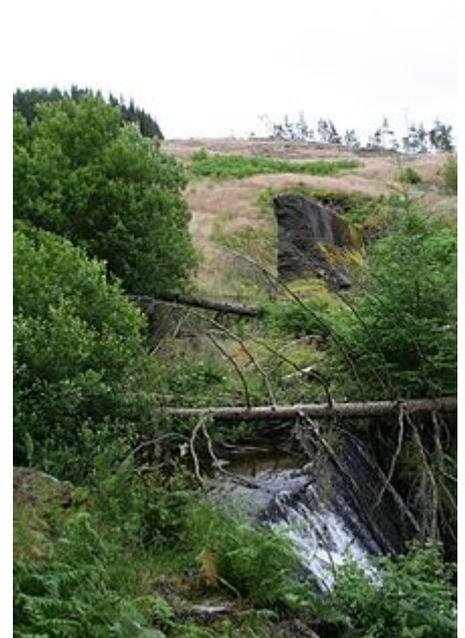
## Assignment

The operation was given to No. 5 Group RAF, which formed a new squadron to undertake the dams mission. It was initially called Squadron "X", as the speed of its formation outstripped the RAF process for naming squadrons.

Led by 24-year-old Wing Commander Guy Gibson, a veteran of more than 170 bombing and night-fighter missions, twenty-one bomber crews were selected from existing squadrons in 5 Group. These crews included RAF personnel of several different nationalities, as well as members of the Royal Australian Air Force



Using two spotlights to adjust altitude, a modified Lancaster dropped a backspun drum-bomb which skipped over torpedo nets protecting the dam. After impact, the bomb spun down to the dam's base and exploded.



Remains of the Nant-y-Gro dam breached in July 1942 during testing

(RAAF), Royal Canadian Air Force (RCAF) and Royal New Zealand Air Force (RNZAF), who were frequently attached to RAF squadrons under the British Commonwealth Air Training Plan. The squadron was based at RAF Scampton, about 5 mi (8 km) north of Lincoln.

The targets selected were the two key dams upstream from the Ruhr industrial area, the Möhne Dam and the Sorpe Dam, with the Eder Dam on the Eder River, which feeds into the Weser, as a secondary target. While the loss of hydroelectric power was important, the loss of water supply to industry, cities, and canals would have greater effect. Also, there was the potential for devastating flooding if the dams broke.

The aircraft were modified Avro Lancaster Mk IIIs, known as *B Mark III Special (Type 464 Provisioning)*.<sup>[3]</sup> To reduce weight, much of the internal armour was removed, as was the mid-upper machine gun turret. The size of the bomb with its unusual shape meant that the bomb-bay doors had to be removed, and the bomb itself hung, in part, below the fuselage of the aircraft. It was mounted on two crutches, and before dropping it was spun up to speed by an auxiliary motor.<sup>[4]</sup>

## Preparations

Bombing from an altitude of 60 ft (18 m), at an air speed of 240 mph (390 km/h), and at a pre-selected distance from the target called for expert crews. Intensive night-time and low-altitude flight training began.

There were also technical problems to solve, the first one being to determine when the aircraft was at optimum distance from its target. Both the Möhne and Eder Dams had towers at each end. A special targeting device with two prongs, making the same angle as the two towers at the correct distance from the dam, showed when to release the bomb. (The BBC documentary *Dambusters Declassified* (2010) stated that the pronged device was not used, owing to problems related to vibration, and that other methods were employed, including a length of string tied in a loop and pulled back centrally to a fixed point in the manner of a catapult.)

The second problem was determining the aircraft's altitude, as the barometric altimeters then in use lacked sufficient accuracy. Two spotlights were mounted, one under the aircraft's nose and the other under the fuselage, so that at the correct height their light beams would converge on the surface of the water. The crews practised at the Eyebrook Reservoir, near Uppingham, Rutland; Abberton Reservoir near Colchester; Derwent Reservoir; and Fleet Lagoon on Chesil Beach. Wallis's bomb itself was first tested at the Elan Valley Reservoirs

The squadron took delivery of the bombs on 13 May after the final tests on 29 April. At 1800 on 15 May, at a meeting in Whitworth's house, Gibson and Wallis briefed four key officers: the squadron's two flight commanders, Squadron Leader Henry Maudslay and Sqn Ldr H. M. "Dinghy" Young; Gibson's deputy for the Möhne attack, Flt Lt John V. Hopgood; and the squadron bombing leader, Flight Lieutenant Bob Hay. The rest of the crews were told at a series of briefings the following day, which began with a briefing of pilots, navigators and bomb-aimers at about midday

## Organisation



Air Vice-Marshal Ralph Cochrane, Wing Commander Guy Gibson, King George VI and Group Captain John Whitworth discussing the Dambuster Raid in May 1943



"Upkeep" bouncing bomb mounted under Gibson's Lancaster B III (Special)



Barnes Wallis and others watch a practice *Upkeep* bomb strike the shoreline at Reculver, Kent.

The squadron was divided into three formations.

Formation No. 1 was composed of nine aircraft in three groups (listed by pilot): Gibson, Hopgood and Flt Lt H. B. "Micky" Martin (an Australian serving in the RAF); Young, Flt Lt David Maltby and Flt Lt Dave Shannon (RAAF); and Maudslay, Flt Lt Bill Astell and Pilot Officer Les Knight (RAAF). Its mission was to attack the Möhne; any aircraft with bombs remaining would then attack the Eder.

Formation No. 2, numbering five aircraft, piloted by Flt Lt Joe McCarthy (an American serving in the RCAF), P/O Vernon Byers, Flt Lt Norman Barlow (RAAF), P/O Geof Rice<sup>[5]</sup> and Flt Lt Les Munro (RNZAF), was to attack the Sorpe.

Formation No. 3 was a mobile reserve consisting of aircraft piloted by Flight Sergeant Cyril Anderson, Flt Sgt Bill Townsend, Flt Sgt Ken Brown (RCAF), P/O Warner Ottley and P/O Lewis Burpee (RCAF), taking off two hours later on 17 May, either to bomb the main dams or to attack three smaller secondary target dams: the Lister, the Ennepe and the Diemel.

Two crews were unable to make the mission owing to illness.

The Operations Room for the mission was at 5 Group Headquarters in St Vincents Hall, Grantham, Lincolnshire. The mission codes (transmitted in morse) were: *Goner*, meaning "bomb dropped"; *Nigger*, meaning that the Möhne was breached; and *Dinghy*, meaning that the Eder was breached. "Nigger" was the name of Gibson's dog, a black labrador retriever that had been run over and killed on the morning of the attack.<sup>[6]</sup> "Dinghy" was Young's nickname, a reference to the fact that he had twice survived crash landings at sea where he and his crew were rescued from the aircraft's inflatable rubber dinghy.

## The attacks

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### Outbound

The aircraft used two routes, carefully avoiding known concentrations of flak, and were timed to cross the enemy coast simultaneously. The first aircraft, those of Formation No. 2 and heading for the longer, northern route, took off at 21:28 on 16 May.<sup>[7]</sup> McCarthy's bomber developed a coolant leak and he took off in the reserve aircraft 34 minutes late.<sup>[8]</sup>

Formation No. 1 took off in groups of three at 10-minute intervals beginning at 21:39.<sup>[7]</sup> The reserve formation did not begin taking off until 00:09 on 17 May.<sup>[7]</sup>

Formation No. 1 entered continental Europe between Walcheren and Schouwen, flew over the Netherlands, skirted the airbases at Gilze-Rijen and Eindhoven, curved around the Ruhr defences, and turned north to avoid Hamm before turning south to head for the Möhne River. Formation No. 2 flew further north, cutting over Vlieland and crossing the IJsselmeer before joining the first route near Wesel and then flying south beyond the Möhne to the Sorpe River.<sup>[9]</sup>

The bombers flew low, at about 100 ft (30 m) altitude, to avoid radar detection. Flight Sergeant George Chalmers, radio operator on "O for Orange", looked out through the astrodome and was astonished to see that his pilot was flying towards the target along a forest's firebreak, below treetop level.<sup>[10]</sup>

### First casualties

The first casualties were suffered soon after reaching the Dutch coast. Formation No. 2 did not fare well: Munro's aircraft lost its radio to flak and turned back over the IJsselmeer, while Rice<sup>[11]</sup> flew too low and struck the sea, losing his bomb in the water; he recovered and returned to base. Barlow and Byers crossed the coast around the island of Texel. Byers was shot down by flak shortly afterwards, crashing into the Waddenzee. Barlow's aircraft hit electricity pylons and crashed 5 km east of Rees, near Haldern. The bomb was thrown clear of the crash and was examined intact by Heinz Schweizer.<sup>[12]</sup> Only the delayed bomber piloted by McCarthy survived to cross the Netherlands. Formation No. 1 lost Astell's bomber near the German hamlet of Marbeck when he flew his Lancaster into high voltage electrical cables and crashed into a field.<sup>[7]</sup>

## Attack on the Möhne Dam

Formation No. 1 arrived over the Möhne lake and Gibson's aircraft ("G for George") made the first run, followed by Hopgood ("M for Mother"). Hopgood's aircraft was hit by flak as it made its low-level run and was caught in the blast of its own bomb, crashing shortly afterwards when a wing disintegrated. Three crew members successfully abandoned the aircraft, but only two survived. Subsequently, Gibson flew his aircraft across the dam to draw the flak away from Martin's run. Martin ("P for Popsie") bombed third; his aircraft was damaged, but made a successful attack. Next, Young ("A for Apple") made a successful run, and after him Maltby ("J for Johnny"), when finally the dam was breached. Gibson, with Young accompanying, led Shannon, Maudslay and Knight to the Eder<sup>[7]</sup> In the attack on the Möhne, one of the bombers made a running commentary on the attack, relayed to base by an airborne TR 1142 (Transmitter Receiver) manufactured by GEC, the distance being too great for direct VHF transmission.<sup>[13]</sup>



Möhne Dam after the attack

## Attack on the Eder Dam

The Eder Valley was covered by heavy fog but not defended. The tricky topography of the surrounding hills made the approach difficult and the first aircraft, Shannon's, made six runs before taking a break. Maudslay ("Z for Zebra") then attempted a run but the bomb struck the top of the dam and the aircraft was severely damaged in the blast. Shannon made another run and successfully dropped his bomb. The final bomb of the formation, from Knight's aircraft ("N for Nan"), breached the dam.<sup>[14]</sup>



Eder Dam on 17 May 1943

## Attacks on the Sorpe and Ennepe Dams

The Sorpe dam was the one least likely to be breached. It was a huge earthen dam, unlike the two concrete-and-steel gravity dams that were attacked successfully. Due to various problems, only three Lancasters reached the Sorpe Dam: Joe McCarthy (in "T for Tommy", a delayed aircraft from the second wave) and later Brown ("F for Freddie") and Anderson ("Y for York"), both from the third formation. This attack differed from the previous ones in two ways: the 'Upkeep' bomb was not spun, and due to the topography of the valley the approach was made along the length of the dam, not at right angles over the reservoir

McCarthy's plane was on its own when it arrived over the Sorpe Dam at 00:15 hours, and realised the approach was even more difficult than expected: the flight path led over a church steeple in the village of Langscheid, located on the hillcrest overlooking the dam. With only seconds to go before the bomber had to pull up, to avoid hitting the hillside at the other end of the dam, the bomb aimer George Johnson had no time to correct the bomb's height and heading.

McCarthy made nine attempted bombing runs before Johnson was satisfied. The 'Upkeep' bomb was dropped on the tenth run. The bomb exploded but when he turned his Lancaster to assess the damage, it turned out that only a section of the crest of the dam had been blown off; the main body of the dam remained.

Three of the reserve aircraft had been directed to the Sorpe Dam. Burpee ("S for Sugar") never arrived, and it was later determined that the plane had been shot down while skirting the Gilze-Rijen airfield. Brown ("F for Freddie") reached the Sorpe Dam: in the increasingly dense fog, the bomb was dropped hastily and also failed to breach the dam. Anderson ("Y for York") never arrived having been delayed by damage to his rear turret and dense fog which made his attempts to find the target impossible. The remaining



Eder Dam in 2004: the destroyed sluice-gate channels on the left were not replaced after the attack.



The crew of "T for Tommy"

two bombers were then sent to secondary targets, with Ottley ("C for Charlie") being shot down *en route* to the Lister Dam. Townsend ("O for Orange") eventually dropped his bomb at the Ennepe Dam without harming it.<sup>[7]</sup>

## Possible attack on Bever Dam

There is some evidence that Townsend might have attacked the Bever Dam by mistake rather than the Ennepe Dam.<sup>[15]</sup> The War Diary of the German Naval Staff reported that the Bever Dam was attacked at nearly the same time that the Sorpe Dam was. In addition, the *Wupperverband* authority responsible for the Bever Dam is said to have recovered the remains of a "mine"; and Paul Keiser, a 19-year-old soldier on leave at his home close to the Bever Dam, reported a bomber making

several approaches to the dam and then dropping a bomb that caused a ~~large~~ explosion and a great pillar of flame.

In the book *The Dambusters' Raid*, author John Sweetman suggests Townsend's report of the moon's reflecting on the mist and water is consistent with an attack that was heading to the Bever Dam rather than to the Ennepe Dam, given the moon's azimuth and altitude during the bombing attacks. Sweetman also points out that the *Ennepe-Wässerverband* authority was adamant that only a single bomb was dropped near the Ennepe Dam during the entire war, and that this bomb fell into the woods by the side of the dam, not in the water, as in Townsend's report. Finally, members of Townsend's crew independently reported seeing a manor house and attacking an earthen dam, which is consistent with the Bever Dam rather than the Ennepe Dam. The main evidence supporting the hypothesis of an attack of the Ennepe Dam is Townsend's post-flight report that he attacked the Ennepe Dam on a heading of 355 degrees magnetic. Assuming that the heading was incorrect, all other evidence points toward an attack on the Bever Dam.<sup>[15]</sup>

Townsend reported difficulty in finding his dam, and in his post-raid report he complained that the map of the Ennepe Dam was incorrect. The Bever Dam is only about 5 mi (8 km) southwest of the Ennepe Dam, and both are similarly on the edges of their reservoirs. With the early-morning fog that filled the valleys, it would be understandable for him to have mistaken the two reservoirs.

## Return flight

On the way back, flying again at treetop level, two more Lancasters were lost. The damaged aircraft of Maudslay was struck by flak near Netterden, and Young's "A for Apple" was hit by flak north of IJmuiden and crashed into the North Sea just off the coast of the Netherlands.<sup>[7]</sup> On the return flight over the Dutch coast, some German flak aimed at the aircraft was aimed so low that shells were seen to bounce off the sea.<sup>[16]</sup>

Eleven bombers began landing at Scampton at 03:11 hours, with Gibson returning at 04:15. The last of the survivors, Townsend's bomber, landed at 06:15.<sup>[7]</sup> It was the last to land because one of its engines had been shut down after passing the Dutch coast. Air Chief Marshal Harris was among those who came out to greet the last crew to land.<sup>[17]</sup>

## List of aircraft involved

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Aircraft call sign	Commander	Target	Attacked target?	Hit target?	Breached target?	Returned?	Notes
<b>First Wave</b>							
G George	<u>Gibson</u>	Möhne Dam	Yes	No	N/A	Yes	Raid leader. Mine exploded short of dam. Used aircraft to draw anti-aircraft fire away from other crews.
M Mother	Hopgood		Yes	No	N/A	No	Hit by anti-aircraft fire outbound. Mine bounced over dam. Shot down over the target while attacking. (P/O Fraser and P/O Burcher survived)
P Peter (Popsie)	<u>Martin</u>		Yes	No	N/A	Yes	Mine missed the target.
A Apple	<u>Young</u>		Yes	Yes	Yes	No	Mine hit dam and caused small breach. Shot down over the Dutch coast while returning.
J Johnny	<u>Maltby</u>		Yes	Yes	Yes	Yes	Mine hit dam and caused a large breach.
L Leather	<u>Shannon</u>	Eder Dam	Yes	Yes	No	Yes	Mine hit target—no effect.
Z Zebra	Maudslay		Yes	No	N/A	No	Mine overshot target and damaged the bomber which was shot down over Germany while trying to return.
N Nancy (Nan)	<u>Knight</u>		Yes	Yes	Yes	Yes	Mine hit the dam and caused a large breach.
B Baker	Astell	N/A	No	N/A	N/A	No	Crashed after hitting large-scale power lines outbound.
<b>Second Wave</b>							
T Tommy	<u>McCarthy</u>	Sorpe Dam	Yes	Yes	No	Yes	Mine hit the target – no apparent effects.
E Easy	Barlow	N/A	No	N/A	N/A	No	Crashed after hitting power lines outbound.
K King	Byers		No	N/A	N/A	No	Shot down over the Dutch coast outbound.
H Harry	Rice		No	N/A	N/A	Yes	Lost the mine after clipping the sea outbound. Returned without attacking a target.
W Willie	<u>Munro</u>		No	N/A	N/A	Yes	Damaged by anti-aircraft fire over the Dutch coast. Returned without attacking a target.
<b>Third Wave</b>							
Y York	Anderson	Sorpe Dam	No	N/A	N/A	Yes	Could not find the target due to mist. Landed at Scampton with an armed mine.
F Freddy	Brown	Sorpe Dam	Yes	Yes	No	Yes	Mine hit the target – no apparent effects.

O Orange	Townsend	Ennepe or Bever Dam	Yes	Yes	No	Yes	Mine hit the target – no apparent effect.
S Sugar	Burpee	N/A	No	N/A	N/A	No	Shot down over the Netherlands outbound.
C Charlie	Ottley		No	N/A	N/A	No	Shot down over Germany outbound. <u>Frederick Tees</u> the sole survivor

## Bomb damage assessment

Bomber Command wanted a complete bomb damage assessment as soon as possible, therefore the CO of 542 Squadron was informed of the estimated time of the attacks. One of the squadron's photo-reconnaissance Spitfires, piloted by Flying Officer Frank "Jerry" Fray,<sup>[18]</sup> took off from RAF Benson at 07:30 hours and arrived over the Ruhr River immediately after first light. Photos were taken of the breached dams and the huge floods.<sup>[19]</sup> The pilot later described the experience.<sup>[18]</sup>

When I was about 150 miles from the Möhne Dam, I could see the industrial haze over the Ruhr area and what appeared to be a cloud to the east. On flying closer I saw that what had seemed to be cloud was the sun shining on the floodwaters. I looked down into the deep valley which had seemed so peaceful three days before [on an earlier reconnaissance mission] but now it was a wide torrent. The whole valley of the river was inundated with only patches of high ground and the tops of trees and church steeples showing above the flood. I was overcome by the immensity of it.

## After the raid



Memorial to Operation Chastise members at Woodhall Spa, Lincolnshire

Three aircrew from Hopgood's aircraft parachuted but one later died from wounds and the others were captured. One of the crew in Ottley's aircraft survived its crash. In total, therefore, 53 of the 133 aircrew who participated in the attack were killed, a casualty rate of almost 40 percent. Thirteen of those killed were members of the Royal Canadian Air Force, while two belonged to the Royal Australian Air Force.<sup>[20]</sup>

Of the survivors, 34 were decorated at Buckingham Palace on 22 June, with Gibson awarded the Victoria Cross. There were five Distinguished Service Orders, 10 Distinguished Flying Crosses and four bars, two Conspicuous Gallantry Medals, and eleven Distinguished Flying Medals and one bar.<sup>[21]</sup>

Initial German casualty estimates from the floods when the dams broke were 1,294 killed, which included 749 French, Belgian, Dutch and Ukrainian prisoners of war and labourers.<sup>[22][23]</sup> Later estimates put the death toll in the Möhne Valley at about 1,600, including people who drowned in the flood wave downstream from the dam.

After a public relations tour of America, and time spent working in the Air Ministry in London writing the book which was later published as *Enemy Coast Ahead* Gibson returned to operations and was killed on a Mosquito operation in 1944.

Following the Dams Raid, 617 Squadron was kept together as a specialist unit. A motto, *Après moi le déluge* ("After me the flood"), and a squadron badge were chosen. According to Brickhill there was some controversy over the motto, with the original version *Après nous le déluge* ("After us the flood") being rejected by the Heralds as having inappropriate provenance (having been coined, reportedly, by Madame de Pompadour) and *après moi le déluge* having been said by Louis XV in an "irresponsible" context. The motto having been chosen by King George VI, the latter was finally deemed acceptable.<sup>[24]</sup> The squadron went on to drop Wallis's massive Tallboy and Grand Slam bombs, including an attack on the German battleship Tirpitz, using an advanced bomb sight which



King George VI speaks to Flight Lieutenant Les Munro while visiting 617 Squadron after the raid, 27 May 1943

enabled the bombing of small targets with far greater accuracy than was routinely obtained with conventional bomb aiming techniques.

In 1977, Article 56 of the Protocol I amendment to the Geneva Conventions outlawed attacks on dams "if such attack may cause the release of dangerous forces from the works or installations and consequent severe losses among the civilian population"<sup>[25]</sup>

## Effect on the war

### **Tactical view**

The two direct mine hits on the Möhnesee dam resulted in a breach around 250 feet (76 metres) wide and 292 feet (89 metres) deep. The destroyed dam poured around 330 million tons of water into the western Ruhr region. A torrent of water around 32.5 feet (10 metres) high and travelling at around 15 mph (24 km/h) swept through the valleys of the Möhne and Ruhr rivers. A few mines were flooded; 11 small factories and 92 houses were destroyed and 114 factories and 971 houses were damaged. The floods washed away about 25 roads, railways and bridges as the flood waters spread for around 50 miles (80 km) from the source. Estimates show that before 15 May 1943 water production on the Ruhr was 1 million tonnes; this dropped to a quarter of that level after the raid.

The Eder drains towards the east into the Fulda which runs into the Weser to the North Sea. The main purpose of the Edersee was then, as it is now, to act as a reservoir to keep the Weser and the Mittellandkanal navigable during the summer months. The wave from the breach was not strong enough to result in significant damage by the time it hit Kassel (approx. 35 km downstream).

The greatest impact on the Ruhr armaments production was the loss of hydroelectric power. Two power stations (producing 5,100 kilowatts) associated with the dam were destroyed and seven others were damaged. This resulted in a loss of electrical power in the factories and many households in the region for two weeks. In May 1943 coal production dropped by 400,000 tons which German sources attribute to the effects of the raid.<sup>[26]</sup>

According to an article by German historian Ralf Blank,<sup>[27]</sup> at least 1,650 people were killed: around 70 of these were in the Eder Valley, and at least 1,579 bodies were found along the Möhne and Ruhr rivers, with hundreds missing. 1,026 of the bodies found downriver of the Möhne Dam were foreign prisoners of war and forced labourers in different camps, mainly from the Soviet Union. Worst hit was the city of Neheim (now part of Neheim-Hüsten) at the confluence of the Möhne and Ruhr rivers, where over 800 people perished, among them at least 493 female forced labourers from the Soviet Union. (Some non-German sources erroneously cite an earlier total of 749 for all foreigners in all camps in the Möhne and Ruhr valleys as the casualty count at a camp just below the Eder Dam.<sup>[23]</sup>)

After the operation Barnes Wallis wrote, "I feel a blow has been struck at Germany from which she cannot recover for several years", but on closer inspection, Operation *Chastise* did not have the military effect that was at the time believed. By 27 June, full water output was restored, thanks to an emergency pumping scheme inaugurated the previous year, and the electricity grid was again producing power at full capacity. The raid proved to be costly in lives (more than half the lives lost belonging to Allied POWs and forced-labourers), but was no more than a minor inconvenience to the Ruhr's industrial output.<sup>[28]</sup> The value of the bombing can perhaps at best be seen as a boost to British morale.

In his book *Inside the Third Reich*, Albert Speer acknowledged the attempt: "That night, employing just a few bombers, the British came close to a success which would have been greater than anything they had achieved hitherto with a commitment of thousands of bombers."<sup>[29]</sup> He also expressed puzzlement at the raids: the disruption of temporarily having to shift 7,000 construction workers to



Memorial to the dead in Neheim, 7 kilometres (4 mi) from the Möhne dam

the Möhne and Eder repairs was offset by the failure of the Allies to follow up with additional (conventional) raids during the dams' reconstruction, and that represented a major lost opportunity.<sup>[30]</sup> Barnes Wallis was also of this view; he revealed his deep frustration that Bomber Command never sent a high-level bombing force to hit the Mohne dam while repairs were being carried out. He argued that extreme precision would have been unnecessary and that even a few hits by conventional HE bombs would have prevented the rapid repair of the dam which was undertaken by the Germans.<sup>[31]</sup>

The effect on food production was more significant, with many square kilometres of arable land being washed away and effectively unusable until the 1950s. There was also a great loss of farm animals bred for food.

## Strategic view

The Dams Raid was, like many British [air raids](#), undertaken with a view to the need to keep drawing German defensive effort back into Germany and away from actual and potential theatres of ground war, a policy which culminated in the [Berlin raids](#) of the winter of 1943–1944. In May 1943 this meant keeping the [Luftwaffe](#) aircraft and anti-aircraft defences away from the Soviet Union; in early 1944, it meant clearing the way for the aerial side of the forthcoming [Operation Overlord](#). The considerable amount of labour and strategic resources committed to repairing the dams, factories, mines and railways could not be used in other ways, on the construction of the [Atlantic Wall](#), for example. The pictures of the broken dams proved to be a propaganda and morale boost to the Allies, especially to the British, still suffering from the German bombing of the [Baedeker Blitz](#) that had peaked roughly a year earlier.<sup>[18]</sup>

An effect of the dam raids was that Barnes Wallis's ideas on [earthquake bombing](#), which had previously been rejected, came to be accepted by 'Bomber' Harris. Prior to this raid, bombing had used the tactic of [area bombardment](#) with many light bombs, in the hope that one would hit the target. Work on the earthquake bombs resulted in the [Tallboy](#) and [Grand Slam](#) weapons, which caused damage to German infrastructure in the later stages of the war. They rendered the [V-2 rocket](#) launch complex at Calais unusable, buried the [V-3](#) guns, and destroyed bridges and other fortified installations, such as the Grand Slam attack on the railway viaduct at [Bielefeld](#). Most notable amongst their successes were the U-boat pens at [Brest](#), where they penetrated 20 ft (6.1 m) thick roofs of reinforced concrete, and the sinking of the [Battleship Tirpitz](#).

## See also

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- [Attack on the Sui-ho Dam](#) during the [Korean War](#)
- [Dam failure](#)
- [Hydroelectric power station failures](#)
- [Operation Eisenhammer](#), a Nazi plan to wreck critical [Soviet](#) hydroelectric turbines in [World War II](#)

## In popular culture

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- A 1954 radio dramatisation of Paul Brickhill's book *The Dam Busters*, produced by Australasian Radio in 26 half-hour episodes, is available for download in zipped MP3 format at [Old Time Radio](#).
- A 1955 film, *The Dam Busters*, was made about the raids and was very popular. Its depiction of the raid, along with a similar sequence in the film *633 Squadron*, provided the inspiration for the Death Star trench run in *Star Wars: A New Hope*. The film is also watched on television by the character Pink in the 1982 film *Pink Floyd The Wall*.
- In 1984, a home computer combat flight simulator *The Dam Busters* was made based on this operation.
- A 1989 British commercial for [Carling Black Label](#) lager reused footage from the attack sequence of the 1955 film, with a German sentry (played by Jon Glentoran, stage name of the artist Jon Dixon) on top of the dam catching the perfectly spherical bombs in the manner of a [football goalkeeper](#). The pilot of the attacking [Lancaster](#) then delivers the brand slogan: "I bet he drinks Carling Black Label!" A subsequent Carling commercial also used bouncing bomb imagery, this time to enable a British holidaymaker to beat the Germans to the sun beds. The adverts were criticised by the [Independent Television Commission](#) although UK newspaper *The Independent* reported "a spokeswoman for the German embassy in London dismissed the idea that Germans might find the commercial offensive, adding: 'I find it very amusing'".<sup>[32]</sup>
- On 12 February 2003, the operation was the subject of an episode of the [PBS](#) series *Secrets of the Dead* entitled "Bombing Nazi Dams".<sup>[33]</sup>

- On 1 September 2006, it was announced that Peter Jackson would produce a remake of the 1955 movie to be directed by Christian Rivers with production starting in 2008. As of December 2015, production has not been started.
- On 16 May 2008, a commemorative event to mark the 65th anniversary was held at Derwent Reservoir, Derbyshire, including a flypast by the Battle of Britain Memorial Flight Lancaster, Spitfire and Hurricane. The event was attended by Les Munro, the only surviving pilot from the original raid, and Richard Todd the actor who played Wing Commander Guy Gibson in the 1955 film. The Hallam's Derwent Valley Museum, located on top of the Derwent Reservoir Dam, also tells the tale of Squadron 617 and its training for Operation Chastise.
- In 2011, a project was initiated to recreate a Dambusters raid. Buffalo Airways would fly the mission, with their plane and pilots,<sup>[34]</sup> and drop a recreation bouncing bomb from their Douglas DC-4 against a recreation dam.<sup>[35][36][37]</sup> The project was televised in the documentary television show "Dambusters Fly Again in Canada", "Dambusters: Building the Bouncing Bomb" in the UK, and Nova episode "Bombing Hitler's Dams" in the U.S.<sup>[38]</sup> The filming of the documentary was itself documented as part of the *Ice Pilots NWT* reality series that follows Buffalo Airways, in season 3 episode 2 "Dambusters".<sup>[39]</sup>

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## External links

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- The Dams Raid with context
- Official site of the Royal Air Force about Operation Chastise
- Dambusters site with details of Operation Chastise including video footage and more
- Online Dambusters exhibition at the UK National Archives
- BBC Online – Myths and Legends – Home of the Dambusters
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- G for George at the Australian War Memorial, Canberra
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- Website about Flt Lt David Maltby and his crew
- Dambusters weblog
- List of all 133 aircrew who took part in Operation Chastise
- 20 Historical Photographs from Operation Chastise
- Allied Psychological Warfare to Capitalise on the Dambusters Raid

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