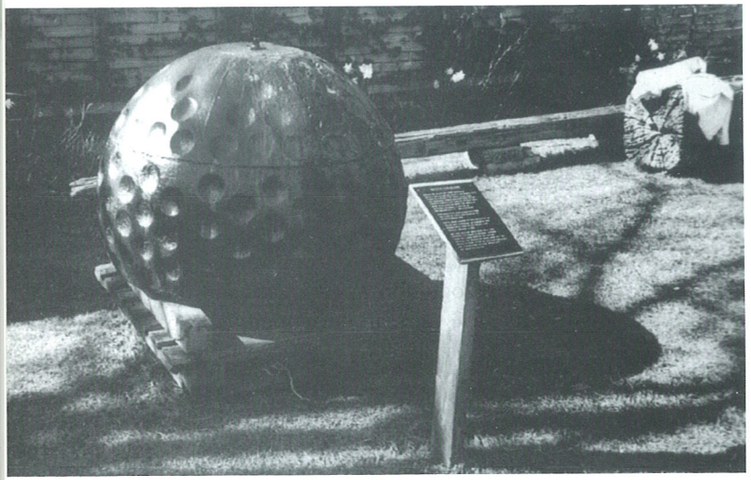

An early version of Barnes Wallis's "bouncing bomb", round in shape and dimpled like a golf ball.

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The first experiments used sphere-shaped bombs dimpled like golf balls but eventually a shape similar to that of a large oil drum was most successful. To ensure a maximum breach, Wallis realised that the bomb would have to sink below the water to a required depth when it met the dam wall, after bouncing across the surface of the reservoir and thus also avoiding the German torpedo nets (the nets had been placed a little distance in front of the wall to prevent underwater missile attacks). Using electric motors to apply backward spin to the bomb before it left the aircraft solved the problem. On the night of 16th–17th May 1943, nineteen specially adapted Avro Lancaster bombers of 617 Squadron, later to become known as the Dambusters, set out from RAF Scampton in Lincolnshire and, despite heavy losses of aircrew and aircraft, achieved their objective.

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The final shape of the Barnes Wallis "bouncing bomb" that was dropped on the dams in Germany's Ruhr Valley in May 1943. The dams supplied water and were also a source of electrical power for German industry.

Interestingly the explosive material, a mixture of TNT (Trinitrotoluene) and aluminium, used in each of the bouncing bombs was known as RDX (Research Department composition X). The material's discovery began in Germany in 1899 and was further developed by the German scientist Hertz in the early1920s. After initial investigation of the explosive at Woolwich, new production facilities were set up at Waltham Abbey and manufacture began in early 1939. So in a somewhat ironic way the work that had begun in Britain with Congreve's gunpowder rocket had been taken over and developed beyond recognition in Germany and then used against the British; while the German developed RDX explosive had been manufactured in Britain and used against the enemy in the Dambusters raid.

On 28th July 1945 the Royal Gunpowder Mills closed and on 30th July it reopened as an experimental wing of the government Armament Research Department. This was a major change in status for Waltham Abbey as the site moved from what was effectively a manufacturing facility to one that would become a world leader in experimental science, not just in explosives, but in advanced chemical engineering and rocket propellants. Much of this work was carried out on the facilities that had been established on the south side of Waltham Abbey and known to the workforce as the south site (the original gunpowder mill complex was known as the north site). To achieve the new objectives, graduate engineers, scientists and chemists were recruited and they soon became established as a highly regarded scientific development team. By October 1946, Waltham Abbey had become the Chemical Research and Development Department and would play a major role in designing and experimenting with a range of new materials that would, in the longer term, have a considerable spin-off for not just the military, but also for industrial and domestic markets.

The wartime rocket attacks on Britain and the development of fighter aircraft equipped with jet engines meant that methods of warfare and defence would never be the same again and strategies would have to change dramatically. It was no coincidence that Waltham Abbey was now placed at the forefront of the new emerging technological challenge. For most people this was an anxious period when the world held its breath as it entered a sensitive and critical phase in history. A phase that would become known as the Cold War, which in turn was to provoke an arms race between East and West.

As the Western world's relations with the East became increasingly strained, the emerging technology of the rocket, as a new form of