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THE “THETIS” DISASTER OF 1ST JUNE 1939
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THE “*THETIS*” DISASTER OF 1st JUNE, 1939

by John Shepherd

Tuesday, 1st June, 1999 marked the 60th anniversary of the loss of the *Thetis* in Liverpool Bay. This article has been compiled from contemporary newspaper cuttings, and extensive reference has been made to the book ‘*The Admiralty Regrets*’ by C.E.T. Warren and James Benson, published in 1958.

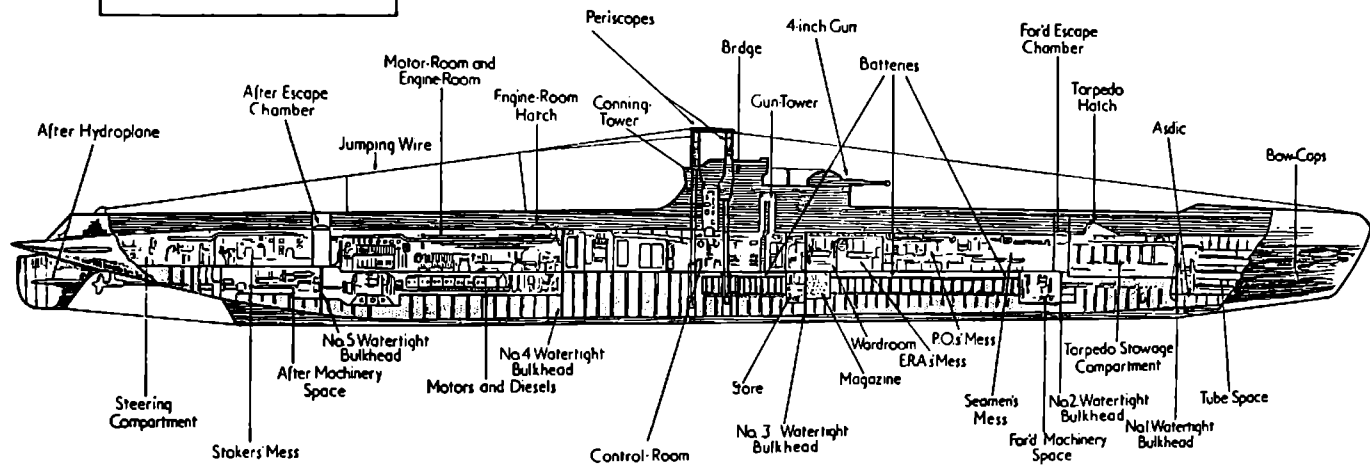
Shortly before 10.00am on 1st June 1939, His Majesty’s Submarine Thetis left Birkenhead under the command of Lt.Cdr. G.H. Bolus, R.N., for Liverpool Bay. The principal purpose of the day was to make a diving trial at sea. She had on board a complement of 103, fifty more than her normal crew. Five hours later she was lying, sunk, 160 feet down, with her bows in the mud. She was only 14 miles from the Great Orme’s Head. Of the 103 men who sailed in her, a mere four survived.

Lt.Cdr. Bolus had joined the *Thetis* a few days before she was launched at Cammell Laird’s yard on 29th June 1938. The *Thetis* was the third of the new ‘T’ class of submarine ordered under the Navy Estimates of 1936. She was the first of the class to be built at Birkenhead. The *Thetis* had been laid down in December 1936 and had been budgeted to cost £350,000. She was 270 feet long overall, displaced 1,575 tons submerged, had a maximum speed of 16 knots on the surface and 9 knots dived, and a range of 8,000 miles. The *Thetis* carried one 4-inch gun and six 21-inch torpedo tubes.

On 30th April, 1939, the *Thetis* sailed on her official sea trials for engines and steering. She was also to undertake her first dive underway in the open sea. However, it was immediately apparent that the steering gear had been connected up incorrectly - port for starboard, and *vice versa*. It seemed strange that acceptance machinery trials, supervised by Admiralty overseers, should have failed to detect so obvious a mistake. Leaving the Mersey, the *Thetis* headed north through the Irish Sea for the trials area in the Firth of Clyde. It had been intended to make the diving trial in the Gare Loch, but as the hydroplanes were being tested, they jammed at ‘*hard to dive*’ and despite all efforts could not be shifted. So the diving trial was postponed, and Admiralty approval was subsequently obtained for it to be carried out at a later date, in Liverpool Bay.

During May came the torpedo equipment trials which were supervised by Lt. Frederick Woods, the *Thetis*’s torpedo officer. The ‘bow-cap’, at the for’ard or seaward end of the torpedo tube, was opened after a torpedo was in the tube prior to firing; the ‘rear door’, inboard, opened to allow a torpedo to

SECTIONAL DRAWING (Simplified)
OF A
"T"-CLASS SUBMARINE
(1939)



enter the tube. Obviously, a bow-cap and a rear door should not be open simultaneously. Each rear door was fitted with a test-cock. This was so constructed that when a small lever was operated, two narrow holes moved adjacent to each other, making a continuous hole through the rear door. An open test cock thus served as a check on the presence of water in a tube. A few days after the torpedo equipment trials, a Cammell Laird sub-contractor commenced work on the insides of the tubes. Unfortunately, when applying bitumastic enamel to the insides of the rear doors, no action was taken to prevent the solution choking the test-cock holes.

There remained a last inspection of the Davis Submarine Escape Arrangements, and the installation of the D.S.E.A. sets themselves. Under Admiralty instructions any submarine proceeding to sea had to have one set of breathing apparatus for each person on board, plus a one-third excess. On the expectation of 98 persons being on board for the diving trial, the *Thetis* carried 131 sets.

A few minutes before the *Thetis* was scheduled to leave Cammell Laird's wet basin, the draft of the hull in the water was taken, fore and aft. The submarine was still four inches higher out of the water for'ard than she had been at the time of the basin dive in March, and she was three-and-a-half inches deeper in the water to port than to starboard. This could be rectified by filling one or more of the starboard torpedo tubes.

It was 9.40am on 1st June, 1939, when the *Thetis* slipped and proceeded out of the basin. She had, all told, 103 men on board. Besides her crew of 5 officers and 48 ratings, she had as passengers 9 other officers from submarine headquarters, 7 Admiralty civilian staff and 26 employees of Cammell Laird. Of the remaining eight, 5 came from other shipbuilding companies, there were 2 from a Liverpool firm of caterers, and the total was made up by the Mersey pilot, Norman Willcox.

For the 26 Cammell Laird employees there was no question of volunteering. A list was put up and everyone named on it was expected to go, but the extra pay could be as much as thirty shillings, no small sum in the late 1930s. Within 20 minutes of slipping, the *Thetis* was slowly edging out of Cammell Laird's basin and into the Mersey on the high tide.

The Liverpool Screw Towing and Lighterage Company's tug *Grebcock* had left Birkenhead before the *Thetis*, for whom she was to act as escort during the trials. The submarine had been lying in a position easily accessible for the Mersey, and the pilot had told the tug's master, Captain A.E. Godfrey, that he would not need any help getting out. Also on board the *Grebcock*, and acting as liaison officer, was Lt. R.E. Coltart. He had five years' experience in submarines and had been appointed First Lieutenant of the *Taku*, a sistership of the *Thetis* being built at Barrow.

The *Thetis* and the *Grebcock* cleared the Bar Light Vessel at about noon. The *Thetis* signalled to the tug: '*Follow me, speed 9 knots*'. The weather

was fine and clear and, as she reached open water, the *Thetis* started her steering trials. Lunch was served as the submarine continued steaming slightly north of west - a course designed to take her to the deeper waters of Liverpool Bay. The *Thetis* reached her diving position just before 1.30pm when she was 38 miles out of Liverpool and 15 miles slightly west of north from the Great Orme's Head. Lt.Cdr. Bolus instructed any of the 'passengers' who might wish to leave the submarine before she dived to come up topside. Nobody appeared, but Coltart on the *Grebecock* had been expecting upwards of twenty men to transfer. Bolus signalled the *Grebecock* to close, and he hailed her through a megaphone: *'I shall not be transferring anybody. Take station half a mile on my port quarter. The diving course will be 310 degrees'*.

At 1.40pm, Bolus despatched his formal diving signal to Admiralty C.-in-C., Plymouth: *'From H.M.S. Thetis. Important. Diving in position 53°35' North, 04°00' West, for three hours'*. The acknowledgement from the Naval Wireless Station at Plymouth arrived at 1.56pm. Immediately Bolus took up position in the *Thetis*'s control room and gave orders for flooding the main ballast tanks in pairs - in slow time. The diesels had already been stopped (with their huge consumption of air they could never be used other than on the surface), and the main electric motors had been ordered *'half ahead'*.

It appeared to the observers on the *Grebecock* that the *Thetis* had too much buoyancy when she started to dive. She got her bows down at a slight angle, and remained in that position for about 20 minutes. Then she levelled off until the top of her guardrails for'ard and aft were just showing above the water. For about another 30 minutes she was in a position where half her conning tower remained above the surface.

At two minutes to three, the *Thetis* went down suddenly and completely disappeared within a minute. Lt. Coltart on the *Grebecock* decided that there was not sufficient reason for speculating that a serious accident might have taken place. If anything disastrous had by any mischance occurred, there would be some immediate sign on the surface - a smoke candle or an indicator-buoy.

The *Grebecock* stopped her engines, going ahead at intervals to stem the one to two knot tide, and trying to remain in the position in which the *Thetis* had dived. The water was too deep for her to anchor. Her whole complement of twelve was searching the surface, looking for the slightest sign. The day was fine and clear with a smooth sea, but no signal of any kind appeared from the *Thetis*. It soon became apparent that the *Thetis* was not adhering to the programme for the dive as she had been due to submerge to check her trim; surface and blow main tanks; dive again to periscope depth; lower periscope; dive to 60 feet and then fire smoke candles.

The *Grebecock* was equipped only with radio-telephony equipment which had an official range of 75 miles, although in Captain Godfrey's experience its performance varied tremendously in different atmospheric

conditions. At 4.45pm Lt. Coltart sent a signal which was intended to convey his anxiety, without causing alarm: '*To Captain S.5, Fort Blockhouse, Gosport, Hampshire. From tug attending on Thetis. What was duration of Thetis dive? Coltart*'. Although the Grebecock was only some 35 miles away from the aerials of Seaforth Radio, reception was very difficult and it was not until 4.56pm that Seaforth finally received and acknowledged the message. It was not until 6.15pm, some ninety minutes after its origination, that Coltart's message reached its destination. Coltart attempted to despatch a second, more urgent, message at about 5.15pm, but the Grebecock's radio-telephony set was quite unable to contact Seaforth Radio.

At about 5.00pm, the Grebecock anchored. The bottom was some 23 fathoms (138 feet) beneath the tug, and in order for the anchor to hold, cable of about three or more times the depth of water would be required. As each of the Grebecock's anchor cables was 40 fathoms long, this meant unshackling the second anchor and adding the free cable to the first, so that the tug was finally lying to one anchor on 80 fathoms of cable.

From 4.45pm onwards, Fort Blockhouse, the Submarine Headquarters at Gosport, had been attempting to contact the Thetis on wireless telegraphy every ten minutes. Culver Wireless Station and the Admiralty were contacted, but neither could report any communication with the submarine. When no surfacing signal had been received from the Thetis by 5.05pm, Captain Macintyre, the Chief of Staff to Flag Officer Submarines, had evidence that she had almost certainly been unable to surface. Yet the first order for search by ship was not despatched until 6.22pm, and the first request for search by aircraft was not sent until 6.50pm. This meant that before either a ship or an aircraft could arrive at the scene it would be sunset. At 5.50pm Captain Macintyre still thought it premature to set in motion the 'Subsmash' drill.

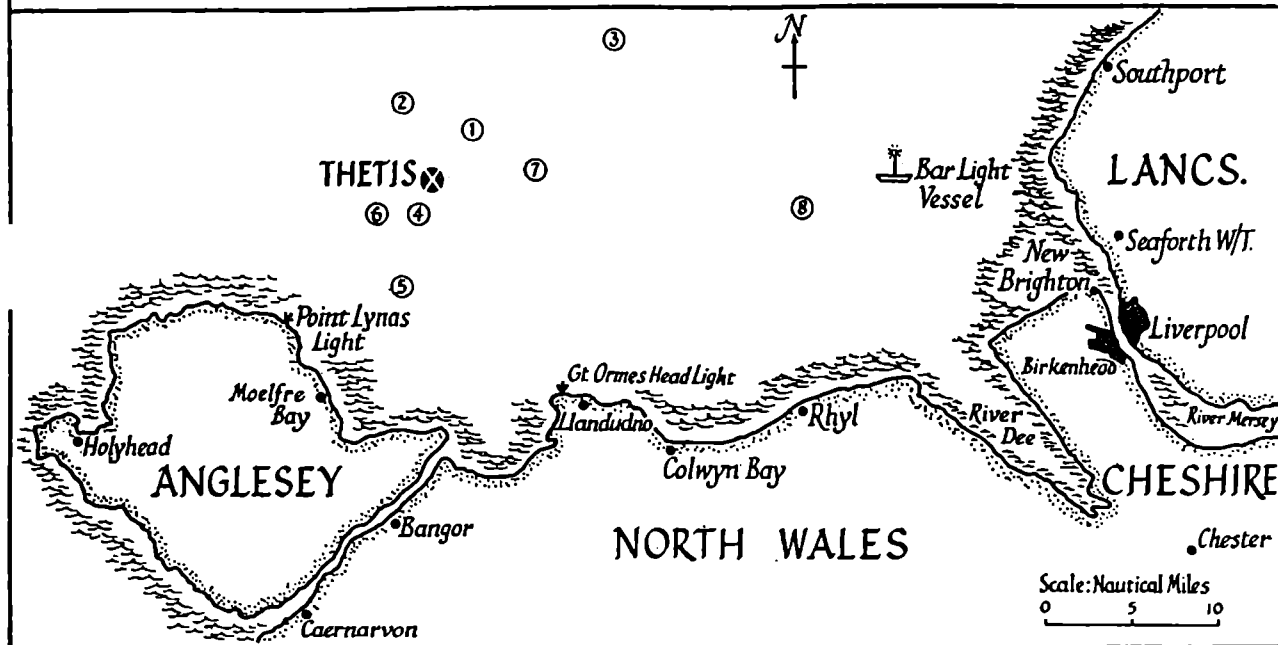
At 5.50pm on 1st June the known facts were as follows. The Thetis was undertaking her diving trial in Liverpool Bay, in open waters and out of sight of land, and in an area of strong tides. She had a number of men on board in excess of her normal complement, and was therefore short of air reserve when submerged for a long time. There was only the tug Grebecock standing by, a vessel not fitted with wireless telegraphy and without the means of underwater signalling to the Thetis.

At 6.15pm Admiralty Fleet Order 971/35 - the then '*Subsmash*' - was radioed as top priority. Orders to report to the scene of the sinking 'with utmost despatch' were sent to a wide variety of units. Two submarines for underwater signalling; a mine-sweeping flotilla for sweeping the sea bottom; a destroyer flotilla from Portland; H.M.S. Tedworth, a deep-diving vessel from the Clyde, and aircraft from various bases were immediately on their way. Somewhat incredibly, Captain Macintyre himself travelled north to take charge of the Thetis operations in the destroyer H.M.S. Winchelsea, a veteran lacking high speed and requiring 19 hours for the passage to Liverpool Bay.

KEY

Note : The actual position of *Thetis* (i.e., the position in which she was found by the destroyer *Brazen*) is indicated by her name.

1 : The position in which *Thetis* dived. 2 : *Grebecock's* position at anchor. 3 : The position reported in *Grebecock's* signal. 4 : The first R.A.F. position. 5 : The second R.A.F. position. 6 : The first position given by s.s. *Delambre*. 7 : The second position given by s.s. *Delambre*. 8 : The position given by s.s. *Meath*.



LIVERPOOL BAY: NINE CHARTED POSITIONS OF "THETIS," JUNE 1 AND 2, 1939

The destroyer H.M.S. **Brazen**, on passage through the Irish Sea to Plymouth from the Clyde, received orders at 6.22pm to divert to the scene, and at 9.03pm she sighted the **Grebecock** and made contact by Aldis lamp. From **Brazen**: *'Are you over the position where the **Thetis** was last seen?'* **Grebecock**: *'No, position approximate'*. The **Grebecock** was unfortunately only too right in stating that her position was an approximate one, and both ashore and afloat the confusion about the likely whereabouts of the **Thetis** was growing worse. The submarine's actual position was 53°33' North 4°04' West, which meant that she lay 14 miles from the Great Orme's Head on a bearing of 328 degrees. The position in which the **Grebecock** had anchored, and which was regarded for some time as the datum position for the search, was some four miles further west. But a signal from the **Grebecock** to Fort Blockhouse, after R/T contact with Seaforth Radio had been resumed, read: *'Am anchored in last position of **Thetis**. Position approximately 12 miles N.W. of North West Buoy'*.

Once this position was charted, it could be seen to be some nine miles to the east of the **Thetis**'s diving position and some twelve miles to the east of where the **Grebecock** was actually anchored. It was almost certainly not generally appreciated that, as the **Grebecock** did not have W/T, she had not known the original diving position as signalled by the **Thetis**. After dark, when the **Grebecock** could identify the Great Orme's Head and Point Lynas lights, her position was corrected back to her original estimate.

The **Brazen** commenced searching an area about three miles to the westward of the **Grebecock**. Had the tug been more or less over the submarine's diving position, this would have been a very good place to start, but the **Grebecock** was already four miles to the north and west of where the **Thetis** was lying, and so this course of action was taking the **Brazen** even further away from the **Thetis**.

An hour and a half earlier, at 7.40pm, a flight of four Ansons of 269 Squadron took off from Abbotsinch, Glasgow and arrived over the area about 9.00pm. The flight spread out but the light was already fading (sunset was at 9.04pm). Before darkness closed in a marker buoy with a flag sticking from it was sighted and at 9.25pm a signal was despatched: *'Important. Marker buoy observed in position 322 degrees Orme's Head 13 miles'*. This position was only a mile south west of where the **Thetis** lay. At the same time as it sent this signal, the aircraft fired four green 'Very' lights which were seen by the **Grebecock** and reported to the **Brazen**. The destroyer steamed in their direction to investigate and remained in the vicinity. The navigator of the Anson was not satisfied with his original position, and the aircraft circled the marker buoy while it was carefully recalculated. Then, at 10.00pm, a second message was sent: *'Cancel my 2125 position of marker buoy. 303 degrees Orme's Head 10½ miles'*. This revised position lay fully seven miles south-south-west of the **Thetis**. Throughout the night the **Brazen** swept this

area, keeping a non-stop Asdic watch and burning her searchlight and two signal projectors.

The first public announcement was given on the BBC's 11.00pm news bulletin: *'The Admiralty regrets to announce that His Majesty's Submarine Thetis has failed to surface'*. By midnight on 1st June, the Thetis had been shut down for ten hours. With her known complement of 103 it could be calculated that, even if all her compartments were full of breathable air, the carbon dioxide content would have risen to approximately 5% of the atmosphere. Experiment would suggest that this would cause panting, but no distress.

There were problems with despatching H.M.S. **Tedworth** to Liverpool Bay. She first had to replenish her empty coal bunkers at Greenock and arrived there during the early morning of 2nd June. It was four hours before any civilian staff could be made available to fuel her. This inability of the **Tedworth** to proceed immediately to the scene of the Thetis's disappearance meant that, during the whole of a vital period of 20 hours, the men in the submarine were deprived of the assistance of the ship and ship's company better qualified to help them than any other.

At 4.00am on 2nd June the Thetis had been submerged for 14 hours. Carbon dioxide content would by now have risen to approximately 5½%. Panting for breath could be expected to have become more marked. However, at this stage the greatest danger from carbon dioxide concentration was that a sudden change to pure oxygen, as supplied by the Davis Submarine Escape Apparatus, would in many cases bring on acute vomiting. And this, in the mouthpiece of a breathing apparatus, could be dangerous in the extreme. This reaction to oxygen was a known factor, being regularly experienced in a milder form whenever a submarine surfaced and flooded her living spaces with clean air after a long period dived.

Sunrise was at 4.48am on 2nd June. During the next hour and a half the steamers **Meath** and **Delambre** reported sighting patches of oil and miscellaneous wreckage in three different positions in Liverpool Bay but none of these could be reasonably connected with the Thetis. At 6.30am the **Brazen** returned to where the **Grebecock** lay at anchor. All the searches to the south and west of the tug had proved fruitless, and so the **Brazen** steamed to the eastward and northward.

At 7.50am the stern of the Thetis was sighted, some 18 feet of it clear of the surface at an angle of about 40 degrees from the horizontal. A signal was immediately sent to Rear Admiral Submarines; the Admiralty; C.-in-C. Plymouth: *'Have located submarine. Tail out of water. 328 degrees distance 14 miles Great Orme's Head. Time of despatch 0754'*.

As the Thetis attempted to dive at 1.56pm on 1st June, the electric motors were running at *'half-ahead'* (about 5 knots) and use of the

hydroplanes had been confined to a moderate angle of dive, certainly not more than 10 degrees. After all the main ballast tanks had been flooded, the *Thetis* should have been below the surface and losing depth steadily. As it was, she was still on the surface, and remained there for over thirty minutes in spite of increased use of speed and hydroplanes to drive her down. All the auxiliary tanks were flooded and with the hydroplanes set at '*hard to dive*' she could only with difficulty be forced down to twenty feet. The whole of the top half of her conning tower would still be churning above the water. It was clear to all the experienced submariners on board that the excess buoyancy was for'ard.

The events of the next ten minutes would seal the fate of the *Thetis*. On the trim statement there was an entry for Nos. 5 and 6 torpedo tubes - they were noted as being '*full*'. The inability of the *Thetis* to dive led Lt. Woods to suspect that these tubes might not, in fact, be full and he determined to satisfy himself as to what their real status was. He decided first of all to use the test-cocks set into the rear doors of the tubes. Starting with No.6, he passed the test-cock lever slowly from the '*locked*' to the '*unlocked*' position and a small amount of water slopped out as he did so. Turning to No.5 tube, he worked the test-cock in exactly the same manner, but no water came out at all. Woods did not make use of the rimer, a pencil-like object provided for running through the holes of the test-cocks to remove dirt, grease or other obstructions. But, due to the bitumastic enamelling, No.5 test-cock was not clear, and whether the tube was full or empty, Woods's test had in fact given him no evidence at all. Puzzled as to the contradiction between his tests and the trim statement, Woods checked with the Cammell Laird foreman engineer, Mr Robinson, who denied that they had been filled. Back in the tube compartment, Woods carried out a repeat of the tests with the same results. He realised that it would probably be necessary to fill the tubes to enable the *Thetis* to dive, and accordingly requested that power be supplied to the bow-caps.

Woods then decided to inspect the insides of the torpedo tubes to see if they were dry or if there was any leakage around the seating of the bow-caps. Having decided to open the rear doors, Woods went for'ard to inspect the bow-cap mechanical indicators. These were six five-inches-in-diameter circular dials set one above the other, and with pointers operated by the rams which actually opened and shut the bow-caps. They were numbered 1, 2, 3, 4, 6, 5. Not 1,2,3,4,5,6. Moreover the dial of No.5 indicator - the lowest one - was extremely difficult to see because of a horizontal bar immediately in front of it. Another complication about the bow-cap indicators was that the '*shut*' and '*open*' positions were in different places on different dials. On No.5, for instance, '*shut*' was at five o'clock, while on No.6 it was at eleven o'clock - in other words, exactly opposite. In spite of all these complications, Woods was able to satisfy himself that all the pointers were at the '*shut*' position.

Woods now worked the test-cock lever of No.1 tube to ascertain that it was empty, and as a prelude for opening the rear door. What he failed to do

was to follow the procedure laid down at Torpedo School which demanded that the state of a torpedo tube should be checked by the drain valve before the rear door was opened. The drain valve system was the normal method of emptying a tube, but a full tube would release over 100 gallons of water into the tube bilge spaces, which would have been far from popular with the First Lieutenant who would have needed to pump it out before he could adjust the trim.

The rear doors of Nos. 1, 2, 3 and 4 torpedo tubes were opened and the tubes found to be dry with no leakage from the bow-caps. Woods was now certain part of the failure of the *Thetis* to dive was due to a misunderstanding about the state of the tubes. Moving on to No.5 tube, Woods pushed up the test-cock lever as he had already done twice previously. Just as before, there was no sign of either air pressure or water. He then started to move the rear door operating lever. It was the first of the five to be in any way stiff. More weight was applied and the lever moved through the last part of its arc. Suddenly, as the lever completed its travel, water surged out of No.5 torpedo tube and quickly flooded the tube space. Despite all the checks, the bow-cap of No.5 torpedo tube had been open to the sea.

Woods shouted a reflex order to his Torpedo Gunner's Mate: '*Fore ends to control room: blow main ballast: we're flooding in fast through No.5 tube*'. There was no possibility at all of a tube rear door being shut by hand against the full pressure of the sea.

In the control room, Bolus immediately gave the order: '*Blow main ballast. Full ahead. Hard to rise. Surface*'. However, within the first few seconds, the *Thetis* had taken an angle down by the bows and had begun to career deeper and deeper. The high pressure air and the motors running at '*full ahead*' were having no effect. The watertight door between the tube space and the torpedo stowage compartment pivoted from for'ard to aft, and was held in the open position by a latch. Before it could be moved it was necessary to get round behind it and let the latch go. Several pairs of hands then swung the door round, but a butterfly-nut, used for securing it, then jammed between the door and the coaming, and more time was lost clearing this. Every moment the *Thetis*'s bows were angling more steeply and the water was gathering on the door coaming between the two compartments. The angle and the pressure of water together were making it impossible to pull the heavy door firmly enough 'uphill' into position before the first of eighteen turn-buckles could be secured to effect a watertight seal. The lights in the two for'ard compartments then went out and in the blackness the crew were fouling one another's efforts.

The seawater was now entering the torpedo stowage compartment. This meant that there was a new danger as the main batteries were in the compartment immediately aft of the stowage area. If the water reached the batteries there would immediately be vast clouds of poisonous chlorine gas throughout the whole boat. Unless the door at the after end of the torpedo

stowage space could be securely shut, there would be no hope for a single man aboard. Accordingly, all attempts at closing the for'ard door to the tube space were abandoned, and all efforts were employed in closing the door in No.2 watertight bulkhead, aft of the stowage space. This door also opened for'ard and had to be pulled 'uphill' against the angle but fortunately, instead of having 18 turn-buckles, it was fitted with one circular, quick-acting lever. As this was being secured there was a jarring, reverberating impact as the Thetis's bows hit the bottom.

When the Thetis's nose smacked into the sea bed, the gauge on the control room bulkhead showed an angle of between 35 and 40 degrees from the horizontal. This meant that she was in about 160 feet of water. The Thetis gradually levelled off and degree by degree the slope was reduced until at 3.40pm she settled at the insignificant angle of some six degrees down. The for'ard indicator buoy was released and a smoke candle was fired from one of the underwater guns.

It was immediately decided to attempt to pump the water out of the two flooded for'ard compartments. The two pumps were both in an unflooded compartment, but before the water could be expelled it was necessary to close the hole through which it had entered. It was proposed to pass a man through the for'ard escape chamber using his Davis escape apparatus. He would then close the rear door of No.5 tube and open the two main line suction valves. After that it should have been possible to start the main ballast pumps and to pump the water out. Three attempts were made to follow this procedure but all had to be aborted due to the volunteers being totally unable to cope with the pressure of the water once the escape chamber was flooded.

The Submarine Service in the middle of 1939 had really very little experience in the art of escaping from a sunken submarine. The training in the use of the Davis Submarine Escape Apparatus was confined to a tank only fifteen feet deep - not much more than the deep end of an ordinary swimming pool. Not only was there the Thetis's crew to be saved, but also fifty civilians whose knowledge of submarines under such circumstances was nil. Admiralty instructions were that there should be no reliance on surface help, but that submariners should use their escape apparatus, waiting, if possible, until they heard a ship on the surface which would signal her readiness to pick up survivors by dropping a succession of small explosive charges.

It was decided to try to raise the stern of the Thetis during the night with the intention of getting the after escape chamber as near as possible to the surface, so as to reduce the water pressure and make easier the process of escape. First of all, ten tons of fresh water were pumped out which presented no difficulties. Problems arose when it came to moving on to the fuel tanks as the Thetis's pumping systems had to be adapted quickly to purposes for which they had not been designed. It took the Cammell Laird fitters several hours to rig a system of pipes from the fuel bunkers to the pumps. By 7.00am on 2nd

June, the angle of the *Thetis* had reached 34 degrees from the horizontal and it was calculated that part of her stern must be out of the water. The condition of the air seemed suddenly to have got very much worse. It was necessary to take deep and distressing breaths. Many men were retching and yawning, and watering from the eyes was continuous. They felt a great lassitude and it required a distinct mental effort to co-ordinate mind and action.

Bolus estimated that under normal circumstances the crew of the *Thetis* could have lasted for 48 hours with the air available. But the *Thetis* had two compartments flooded and nearly a double crew on board. This brought the estimate for the limit of activity down to about 24 hours or to about 3.00pm on 2nd June. They all knew that they could not afford to wait any longer before attempting to escape. However quickly the escapes could be made from the after escape chamber - the only one at a reasonably shallow depth - the full complement would not have sufficient time to get out.

The First Lieutenant, Lt. Oram offered to go up to the surface with a plan of action strapped to one arm in a watertight cover, so that if he did not survive and his body was found, the message would still be intact. Bolus's view was that he would prefer Lt. Woods to accompany him as he had the greatest knowledge of the part of *Thetis* to which the disaster had occurred, and he would be of the maximum value in explaining the situation and helping the salvors. The plan to be carried by Oram, in its basic form, requested high pressure air to charge the *Thetis* through either the gun recuperator connection or the whistle connection on the bridge. A pre-requisite was for a diver to tighten down the forehatch so that the blow could be put on the forward flooded compartments without lifting the hatch.

Just as Oram and Woods were entering the escape chamber there came a series of dull, subdued explosions signifying that charges had been dropped from a vessel on the surface. Inside the chamber the escape had gone quite smoothly, although both men had found great difficulty in concentrating on the correct drill due to carbon dioxide poisoning. But as the chamber finished flooding they pushed up the top hatch and found that it was still about twenty feet under water. They both floated clear and rose to the surface.

Back in the *Thetis* the escape chamber was drained down. One of the crew swung open the door but in his impatience he had not waited long enough and a quantity of water slopped out. Normally this would not have mattered but the extreme angle of the *Thetis* meant that the coaming of the bulkhead door alongside the chamber was not high enough to contain all the water and within seconds a few gallons had swirled into the motor-room and on to the main motors and the switchboard. Immediately there was the crackle of the sharp, dry flashes of a short-circuit and a cloud of thick white suffocating smoke welled up. The group of men around the escape chamber seized gas-masks or D.S.E.A. sets and within moments were breathing more easily. After a few minutes the smoke subsided but the change in the condition of the

remaining air was remarkable. The brief period of combustion had consumed a large amount of the remaining oxygen.

Taking into account the D.S.E.A. sets used during the fire, plus the 29 sets in the flooded forward compartments, and the five used in the attempts to get forward and shut the rear door of No.5 torpedo tube, there were now not enough remaining to go round, despite the excess carried.

After the success of Oram's and Woods's escape, four men were now ordered to squeeze themselves into the escape chamber which was designed for just two. The safety clip was removed so as to leave the escape hatch free to open as soon as the water pressure inside had equalised with that of the water above. The flood valves were operated. After twenty long minutes there was no indication that the four had managed to open the hatch and float clear. The order was given to drain the chamber down. As the door was swung gently open it was seen that the four were still inside - drowned. For whatever reason, perhaps confusion caused by carbon dioxide poisoning, they had been unable to open the hatch.

Another attempt was immediately set up with Leading Stoker Walter Arnold from the *Thetis's* crew and Frank Shaw, an engine fitter from Cammell Laird. It was almost 10.00am. As the water in the chamber rose, Shaw put up one hand in an attempt to open the hatch. Arnold motioned to him that the water had to come up higher to equalise the pressure. A minute or two later Arnold indicated to Shaw to try again. For a fraction of a second there was no movement but then the hatch shifted and both men felt themselves shooting up towards the surface.

The first successful escape by Oram and Woods had taken place at 8.07am on 2nd June. They were quickly hauled into the *Brazen's* whaler and taken on board. Oram reported to Lt.Cdr Mills of the *Brazen* that: *'Everyone is alive on board. They will be escaping at regular intervals of about 20 minutes. Don't try to go alongside, it would only endanger the attempts to get out. I'm confident that the majority will be saved'*. Mills sent the following message: *'To Rear-Admiral Submarines; Admiralty; C-in-C. Plymouth. Lieutenant Oram and Lieutenant Woods are in Brazen. All the rest of the crew are alive in submarine and endeavouring to escape by D.S.E.A. Time of Despatch 0826'*.

It was at 10.40am when the Sixth Destroyer Flotilla, commanded by Captain R.S.G. Nicholson in H.M.S. *Somali*, arrived from Portland. He could advance no reasons to fault the *'keep away from the escape area until you can connect an air-pipe'* instructions which Oram had brought up with him. The lack of even one officer thoroughly experienced in submarines was being keenly felt. Captain Macintyre, Chief of Staff to Flag Officer Submarines, was still some five hours away on board H.M.S. *Winchelsea*.

With no further successful escapes taking place it was agreed to try and get the *Thetis's* stern high enough out of the water for a hole to be cut in

it by which her whole complement could escape, or through which someone from outside could get in. The Mersey Docks and Harbour Board's salvage steamer **Vigilant** had arrived and orders were given for a 3½-inch wire hawser to be passed round the **Thetis's** stern and made fast to the **Vigilant's** bows.

Meanwhile the divers and crew of the deep-diving vessel **Tedworth** were still at the Greenock coaling base. No attempts were made to get them down to Liverpool Bay by road or air. It was noon on 2nd June before the **Tedworth** completed taking bunkers and sailed for the scene of the disaster, at least twelve hours steaming time away.

Back on the **Vigilant**, the two ends of the 3½-inch wire hawser had been made fast. The wire led from the salvage vessel's bows, round the **Thetis's** stern, and back again. The time was 1.10pm, and the **Thetis** had been submerged for fifty minutes short of twenty-four hours. Two tugs were secured and within minutes they were towing the **Vigilant** astern and the combined efforts of the three vessels were soon to be seen on the **Thetis**. By 1.30pm she was noticeably higher out of the water. Her propellers were well clear and a sizeable portion of her after hull had been exposed.

The Mersey Docks and Harbour Board's Wreck Master Charles Brock, from the **Vigilant**, was rowed over to the **Thetis's** stern. He managed to find both handhold and foothold and started work on one of the manholes near the stern. On at least two occasions Brock noticed a large bubble of air break surface near him and he assumed that further escapes were being attempted. Brock removed the outer cover of the manhole without much difficulty. As he started work on the bolts of the inner cover, Brock thought he heard a hissing of air. As the lifting of a bolt allowed the two surfaces of metal to come clearly apart, the hissing became a distinct jet - of air under pressure. Brock was not prepared for this and wondered if he should let the pressure escape, or was he ruining some internal plan for building up buoyancy? In a matter of seconds, Brock tightened the inner cover and the escaping air stopped. His information was relayed back to the **Vigilant**.

At 2.40pm the **Thetis** suddenly pivoted round on her stern. Within a few moments her stern was pointing towards the west, with the result that the west-running ebb was pushing hard against her, acting to force her back beneath the surface. Brock was ordered off the **Thetis**. The **Vigilant** then steamed in close to the **Thetis**, taking in the slack on the 3½-inch hawser, and preparing to heave in once again at the submarine's stern. Minutes later the **Somali** berthed alongside the **Vigilant** in order to use her electric drill for cutting a hole in the submarine's stern. The tug **Crosby** then arrived from Liverpool, bringing with her the oxy-acetylene cutting gear that had been requested five-and-a-half hours earlier. Once more the **Vigilant's** winch began heaving in and the two tugs astern began towing the salvage vessel. Slowly the **Thetis's** stern increased its angle and came further out of the water.

Without any warning the **Thetis's** stern started to cant over. Almost

immediately the hawser parted and the stern sank beneath the water. Hope had required an absolute certainty that the *Thetis's* stern would be held out of the water at whatever cost. At just after 3.00pm on 2nd June, the stern had disappeared.

On board the *Thetis* a final escape attempt was under way. Two men were in the escape chamber. The door was closed and the flooding system was open to the sea. The water in the chamber rose. What happened next will never be known. Perhaps the two men trying to escape had got as far as trying the hatch, but certainly the flood valve had not been turned off and the chamber was still open to sea pressure. In the event, one of the men in the escape chamber opened the chamber's for'ard door, probably as a result of confusion and disorientation caused by severe carbon dioxide poisoning. This for'ard door led into the *Thetis's* engine room. Once again two adjacent apertures were open simultaneously to the sea, and the water flooded into the *Thetis*. First it had been the two doors of No.5 torpedo tube; now it was the flood valve and the engine room door of the aft escape chamber.

Within seconds - a minute or so at the most - all the occupants of His Majesty's Submarine *Thetis* succumbed to the abrupt rise in the concentration of carbon dioxide that the rapid increase in pressure instantaneously caused. It was just after 3.00pm on Friday afternoon, 2nd June 1939. The *Thetis* slid gradually through the waters until she came to rest in the mud of Liverpool Bay.

At 4.10pm on the following afternoon, some 25 hours after the last man alive in the *Thetis* had perished, and some 13 hours after a normal crew's air supply would have been exhausted, a statement was issued from Whitehall: *'The Admiralty regrets that hope of saving lives in the Thetis must be abandoned'*.

At 11.15am on Sunday 4th June, the Admiralty issued the following statement: *'Salvage work on H.M.S. Thetis is proceeding, but it may be some time before the vessel can be brought to the surface. Messrs Cammell Laird & Company will be responsible for the work from now onwards, but H.M.S. Tedworth will remain on the spot to render any assistance or advice required by the firm. A full inquiry is being held as soon as possible'*.

Wednesday 7th June was the occasion of the Memorial Service at Sea. The cortège was led from the Mersey, over the last 38 miles that the *Thetis* had covered on her last voyage, by the minesweeper H.M.S. *Hebe*. Most of the relatives and those intimately concerned with the lost submarine were standing on the open deck. Before she reached the spot where the *Thetis* lay, the *Hebe* had been joined by a congregation of salvage vessels, lifeboats and miscellaneous light craft. The service was conducted from the minesweeper's quarterdeck by the Rev'd. G.H. Crouch, R.N., the Submarine Service's

Chaplain at Fort Blockhouse.

There was much speculation as to whether the **Thetis** should be raised at all. A paragraph in the *Liverpool Echo* ran: '*It is understood that most of the relatives who attended the memorial services regarded them as the funeral services of their loved ones. For the vessel to be raised and the bodies to be removed from the tomb in which they have now rested for a week would, it is thought, only serve to reopen the wounds already deep in the hearts of those left behind.*'

On 9th June it was decided that the sole responsibility for, and control of, salvage operations on the **Thetis** should be entrusted to the Liverpool and Glasgow Salvage Association. The **Thetis** had sunk in a depth of 150 feet at low water springs. The tidal range at the spot was 22 feet, so that diving would often be taking place in up to 172 feet of water. At times there was no slack water period at all, and, at best, absolute slack water did not exceed 30 minutes. The tidal stream at the surface reached a speed of 4 knots.

The Liverpool & Glasgow Salvage Association had decided that the only lifting medium likely to succeed would be a merchant ship of approximately the same length as the **Thetis**. She would need to be moored directly above, and eight nine-inch wire slings would have to be used to connect the two craft together. It was not long before a suitable candidate was found - she was the **Zelo**, and was lying at Cardiff under Admiralty charter. The **Zelo** was immediately despatched to Birkenhead where giant lifting beams were rigged athwartships across her deck at the points where it was planned the eight wires would be slung. She was ready to leave Cammell Laird's basin on 28th June but bad weather set in and she was detained for two days by a southerly gale.

On the night of 5th July the **Tedworth's** divers started going down to reeve medium-weight wires under the **Thetis's** bows and immediately for'ard of her keel. These were the wires that would ultimately pull the huge nine-inch hawsers into position.

In the early hours of Friday 7th July a full gale from the south-west struck the **Zelo** and her starboard moorings dragged. She had to return to Birkenhead for repairs. Severe weather set in and it was not until 16th July that she was back in position above the **Thetis**. Eventually all was set for the lift to commence, and it started according to plan. However, the wires and the beams lifting the **Thetis's** bows came under greater pressure than the others and the wooden beams on the **Zelo** began to twist. The lift had to be abandoned and the **Zelo** returned, once again, to Birkenhead.

It was agreed to replace the timber beams with steel girders. It was the Cammell Laird view that the salvage should be abandoned. The chairman, Mr R.S. Johnson, held that: '*the Thetis should lie where she is and the bodies be left in peace*'. But, once the decision was taken to go ahead again, continuous day-and-night work had the **Zelo** ready for 24th August. On 26th August, the **Zelo** was once again in position over the **Thetis**, and the **Tedworth's** divers

had all the lifting wires in position by the early morning of 28th August. Low water was at 6.30am and aboard the *Zelo* the nine-inch slings were hauled into position using the ship's derricks. The noon high tide raised the *Thetis* gently off the bottom, and the *Zelo* moved off on the first leg of the journey inshore towards the east coast of Anglesey. Every time that the *Thetis* grounded the lifting slings had to be hove taut at the next low water and re-pinned around the steel girders.

Nine lifts were made in seven days. By the afternoon of the sixth day, Saturday 2nd September, the operation had reached a depth of only six fathoms (36 feet) at low water. The final stage of the salvage was approaching. On the afternoon of 3rd September 1939 the *Thetis* grounded gently on the edge of a sandbank near Moelfre Bay. She had reached the farthest point inshore to which the *Zelo* could transport her. The eight nine-inch slings were cast off and at the next low water the *Thetis*'s conning tower could be seen a few feet below the surface.

On 7th September the divers were working on unscrewing the bolts which were holding down the engine room hatch so that access could be gained to the hull. In order to open some of the bulkhead doors in the *Thetis*, to permit the free flow of compressed air and the free drainage of water throughout the boat once the 'blowing' stage of the proceedings was reached, the divers had to get forward to the control room. This meant negotiating the engine room and it necessitated all the bodies which were congregated there being removed. On the afternoon of Monday 23rd October, the *Thetis* was given the full supply of compressed air. At 2.00pm her stern broke surface, followed by her bows half an hour later. She was afloat again and was beached at Moelfre Bay. It was not until 12th November that the last of the bodies was finally recovered from the after machinery compartment.

The *Thetis* was next drydocked at Holyhead where the physical soundness of her hull structure was confirmed. She was then towed, still under the care of the Liverpool and Glasgow Salvage Association, back to Birkenhead where she arrived on 18th November, 1939.

The Tribunal appointed to inquire into the loss of His Majesty's Submarine *Thetis* had commenced its proceedings on 3rd July 1939. The dramatic moments came almost entirely from the four men who had escaped: Lieutenant Oram, Lieutenant Woods, Leading Stoker Walter Arnold and Frank Shaw from the Cammell Laird staff. The Tribunal reported that at least six factors acting in sequence produced the full extent of the disaster. First and second came the complete blocking of the vital test-cock with bitumastic enamel, and the opening of the rear door of No.5 torpedo tube while the bow-cap was open to the sea. Third and fourth came the failure aboard the *Thetis* to shut the first water-tight door, and the subsequent failure to expel the water from the two flooded compartments. Fifth came the failure of those

outside the *Thetis* to render effective assistance. And finally came the failure of those aboard the *Thetis*, other than the four survivors, to escape by D.S.E.A.

Key questions centred around the bow-cap. Why was it opened? When was it opened? By whom was it opened? The Tribunal found on the evidence that was presented to it that the bow-cap had not been opened until '*not many minutes before the accident, but there is no reliable evidence establishing the time more precisely than that*'. The relevant section of the Report reads: '*There was evidence that if the bow-cap had been open for a considerable time while Lt. Woods and those under him were in charge of the tube compartment, they would probably have noticed it for certain technical reasons*'. Just what these reasons were did not appear in the Report. Presumably if a flooded tube was going to be apparent it could be expected that its effect would be felt on the handling of the boat - perhaps the *Thetis* would yaw a little or carry a degree or two of port helm? Furthermore, when the *Thetis* was salvaged, the mechanical indicator of No.5 tube bow-cap was at '*open*', and may well have been at '*open*' for the whole of the passage out from Birkenhead. Taking into account the *Thetis*'s drafts which were read in Cammell Laird's basin, it would seem that No.5 tube was flooded before she sailed from Birkenhead.

The *Thetis* was stripped immediately her salvors returned her to Cammell Laird's yard at Birkenhead. For a few weeks an Admiralty decision was awaited. By late 1939 submarines were needed as fast as the Royal Navy could get them, and so the *Thetis*'s hull was refitted and the boat was renamed *Thunderbolt*. No attempt was made to enforce her new identity by means of a formal relaunching or renaming ceremony. One modification in the *Thunderbolt*'s torpedo equipment regularly called to mind her previous identity. On the rear door of each of the torpedo tubes was fitted a '*Thetis-clip*', as it was already universally known in the Submarine Service. This was a single dog-clip which initially prevented the door from opening more than a fractional amount, and which would reduce the inflow of water in any subsequent mishap to manageable proportions.

At 2.00pm on 3rd December 1940 His Majesty's Submarine *Thunderbolt* slipped from alongside H.M.S. *Forth* on the Clyde and went to war. She served the Royal Navy well until 14th March 1943 when she was depth-charged off Cape San Vito, at the north-western tip of Sicily, and sank in 3,000 feet of water.

On 2nd June 1943, four years and a day since she had first dived in Liverpool Bay, the *London Gazette* carried an Admiralty communiqué: '*The Admiralty regrets to announce that His Majesty's Submarine Thunderbolt must now be considered lost*'. ■