

FINDINGS OF THE COURT OF INQUIRY

THAT the U.S.S. *Squalus* was built at Navy Yard, Portsmouth, New Hampshire, commissioned on 1 March 1939, and completed on 12 May 1939.

That the U.S.S. *Squalus* left the Navy Yard, Portsmouth, New Hampshire on 15 May 1939, for operations in accordance with Operation Order No. 4-39 issued by Commandant, Navy Yard, Portsmouth, New Hampshire.

That prior to 23 May 1939, the *Squalus* had made eighteen successful dives.

That at 0740 EST, 23 May 1939, the *Squalus* made a dive from main engines, 16 knots speed, in training for the dive required by trial requirements approved by the Secretary of the Navy.

That during this dive water entered the vessel through the main engine induction valve, flooding the four compartments of the ship abaft of the after control room bulkhead, causing the vessel to sink in approximately 240 feet of water.

That the vessel was properly organized and officers and crew stationed in accordance with requirements for acceptance trials and good submarine practice.

That prior to this dive the vessel was properly rigged for diving and was so reported to the Commanding Officer.

That during this dive the Commanding Officer received a report that the engine rooms were flooding, whereupon he took the proper steps to bring the ship to the surface but was unable to do so due to the extent of flooding.

That the watertight door between the after battery compartment and forward engine room was on the latch before flooding and was dogged just after flooding started, during which time some water had entered the after battery compartment.

That an attempt was made to close the forward engine room bulkhead ventilation flapper valve in the supply duct and this could not be done.

That an attempt was made to close the exhaust hull stop on the ventilation system and this could not be done.

That a solid stream of water was seen pouring into the forward engine room through the engine induction.

That the following hull valves were not closed:

Main engine induction,

Forward engine room induction hull valve,

After engine room induction hull valve,

The ventilation supply hull valve in after battery compartment,
and

The ventilation exhaust hull valve in after battery compartment.

That the upper after torpedo tube doors were cracked and vents were open.

That after an unsuccessful attempt to keep water from the after battery compartment, it was abandoned and the watertight doors and ventilation stops in the forward bulkhead were secured.

That some water entered the control room through the ventilation system before these ventilation stops were secured.

That from the time of sinking until the rescue was complete the morale and discipline of the officers and crew was of the highest standard and in accordance with the best traditions of the service.

That those lost as result of the sinking of the *Squalus* died by drowning at their stations in the performance of their duties and not as result of their own misconduct.

RESCUE

That at 0940 EST 23 May 1939, when the routine surfacing report required by doctrine of Operation Order 1-39 was not received, the action taken by Rear Admiral C. W. Cole, Commandant, Navy Yard, Portsmouth, was remarkably prompt and complete.

That as a result of his action the responses of the Navy Department, Commander Submarine Squadron Two and Submarine Base, New London, and all other activities in position to assist were expeditious and efficient.

That the U.S.S. *Sculpin*, at the direction of the Commandant, Navy Yard, Portsmouth, searched the *Squalus*' operating area and sighted a red smoke bomb and shortly thereafter sighted the *Squalus*' marker buoy.

the U.S.S. *Falcon* arrived at the scene at 0425 EST 24 May
egan operations.

the rescue of the following survivors was complete at 2325
4 May, via rescue chamber and forward torpedo room hatch:

Lieutenant O. F. Naquin

Lieutenant W. T. Doyle, Jr.

Lieutenant (jg) R. N. Robertson

Lieutenant (jg) J. C. Nichols

Blanchard, Roland, fireman, second class

Bland, Judson T., electrician's mate, first class

Boulton, William D., seaman, first class

Bryson, Allen C., fireman, first class

Booth, Arthur L., radioman, first class

Campbell, Roy H., chief torpedoman

Coyne, Gavin J., machinist's mate, second class

Cravens, Eugene D., gunner's mate, first class

Elvina, Feliciano, mess attendant, first class

Fitzpatrick, William J., torpedoman, second class

Gainor, Lawrence J., chief electrician's mate

Galvan, Basilio, mess attendant, first class

Isaacs, William, ship's cook, second class

Jacobs, Theodore, signalman, third class

Kuney, Charles S., yeoman, second class

Maness, Lloyd B., electrician's mate, third class

McLees, Gerald C., electrician's mate, second class

Medeiros, Leonard de, torpedoman, third class

Murphy, Francis, Jr., quartermaster, first class

Persico, Donato, seaman, first class

Pierce, Carol M., machinist's mate, second class

Powell, Carlton B., machinist's mate, second class

Powell, Charles A., radioman, second class

Prien, Alfred G., machinist's mate, second class

Washburn, Robert L., seaman, second class

Yuhas, Charles, machinist's mate, first class

Smith, Warren W., signalman, second class

O'Hara, Raymond P., pharmacist's mate, first class

Harold C. Preble, Naval Architect

That the rescue chamber operated as designed and normally until the fourth and last trip when the down-haul cable jammed.

That by the use of the rescue chamber it was ascertained that no life could exist in the after part of the vessel.

That the survivors suffered no serious ill effects or permanent injuries.

SALVAGE

That rescue operations ended and salvage operations began at 2007 EST 25 May and were prosecuted day and night, Sundays and holidays, until the salvage was successfully completed at 0700 15 September 1939 when the vessel was placed in dry-dock at the Navy Yard, Portsmouth, New Hampshire.

That the salvage was accomplished under unusually difficult and hazardous conditions with the vessel in 240 feet of water, with the stern of the vessel buried in approximately 15 feet of mud, with a list to starboard.

That during salvage operations divers made the following changes in valves and hatches:

1. The engine induction valve was gagged shut.
2. Both engine induction hull valves were closed.
3. Both ventilation hull valves were closed.
4. The high battery ventilation valve was gagged shut.
5. Attempt was made to close the forward battery hull ventilation valve.
6. Port main engine exhaust valves were gagged shut.
7. After battery room hatch was found to have opened and this hatch was closed.
8. The after torpedo room hatch was opened and closed and later was closed and backed up with a strongback after being damaged during the salvage.

That all flooded compartments were partially dewatered through compartment salvage lines after the high induction was gagged.

That the ventilation induction valve was found to be closed and was not touched during salvage or rescue operations.

EXAMINATION OF MATERIAL

That no operating gear of the *Squalus* was moved prior to examination by the court.

That all operating gear was found to be in the correct position for diving with the exception of the operating gear of the main engine induction valve which was latched wide open.

That the one lever on the hydraulic manifold which controls both the engine induction and the ventilation induction valves was in the closed position.

That the ventilation induction valve gear was found in the closed position and the engine induction valve gear was found in the open position.

That upon test witnessed by the court, the engine induction and the ventilation induction valves operated properly with hydraulic power supplied by hand pump.

That on the *Sculpin* it was found that with the engine induction valve gear in the latched open position, the gear could be moved a sufficient amount, toward the closed position, to break the red light contact, with the latch still in position to hold the gear open, thereby giving neither red nor green light on the hull opening indicator.

That the engine induction indicator light is located below the ventilation induction indicator light, these two valves operating from the same hydraulic control lever, and is next to a blank indicator box on an otherwise symmetrical board.

That the estimate of cost to recondition the vessel is—Bureau of Engineering \$1,000,000., Bureau of Construction and Repair \$350,000., Bureau of Ordnance \$40,000., Bureau of Navigation \$10,000., total \$1,400,000.

That on a shop test of the *Squalus*' induction valve operating gear with the latching cylinder check valve removed, the gear could not be closed hydraulically.

That there is a difference in latching surfaces in *Squalus* and *Sculpin* induction valve gear because of required hand finishing.

OPINIONS

It is the opinion of the court that:

The U.S.S. *Squalus* was lost due to a mechanical failure in the

operating gear of the engine induction valve.

This mechanical failure was not discovered in time, due to either an electrical failure in the valve indicator or a mistake in reading this indicator by the operating personnel.

No offenses have been committed and no serious blame has been incurred.

The officers and crew of the U.S.S. *Squalus* were well trained and efficient.

Lieutenant Naquin displayed outstanding leadership during the sinking of the U.S.S. *Squalus* and rescue of her survivors.

The rescue of the survivors in the U.S.S. *Squalus* was performed efficiently and expeditiously.

The salvage of the U.S.S. *Squalus*, with the equipment available, was an outstanding accomplishment.

Robert P. Thompson, SC3c, U.S. Navy, as a result of the sinking of the U.S.S. *Squalus*, died by drowning at his station in the performance of his duty and not as the result of his own misconduct.

Robert P. Thompson, SC3c, U.S. Navy attempted to escape through the hatch in the after battery compartment, undogged the hatch, and his body was later washed out that hatch which was later found open by the divers.

RECOMMENDATIONS

The court recommends that:

No further proceedings be taken against any officer or member of the crew of the U.S.S. *Squalus*.

The engine induction valve and the ventilation induction valve be operated by separate hydraulic control levers.

The hull opening indicator board be rearranged to include only those hull openings which are closed at "rig for diving" and that the engine induction and ventilation induction indicators be together on a separate and distinct board.

The ventilation supply and exhaust hull valves and engine induction hull valves should be quick closing.

These valves should be equipped with electrical indicators which indicate on a separate board in the control room.

The latching arrangement for engine induction valves be redesigned to insure positive operation for locking and release for both open and closed positions.

Ventilation duct bulkhead flapper valve housings should be constructed pressure proof.

All deck hatches of all submarines should be fitted to take the rescue chamber.

WILLIAM T. TARRANT,
Rear Admiral, U.S. Navy.

THOMAS WITHERS,
Captain, U.S. Navy.

WILLIAM R. MUNROE,
Captain, U.S. Navy.

ACTION OF THE SECRETARY OF THE NAVY ON THE REPORT OF
"SQUALUS" COURT OF INQUIRY

Subject: U.S.S. *Squalus*—Court of Inquiry to inquire into all the circumstances connected with the sinking near Portsmouth, New Hampshire, on May 23, 1939; into subsequent operations to rescue personnel; and into subsequent salvage operations.

The proceedings, findings, opinions and recommendations of the Court of Inquiry in the foregoing case and the endorsements of the Bureaus and Offices, to whom the record was referred, present certain questions for decision. In order to set forth clearly the holdings of the Secretary of the Navy on these questions certain aspects of this case will be given detailed exposition.

The U.S.S. *Squalus*, a newly commissioned submarine, had operated at sea over a period of about eleven days. These operations had been preceded by extensive instruction of the crew. She had made eighteen dives previous to her last and fatal one.

On the day of her sinking, the *Squalus* was operating at sea under The Chief of Naval Operations, and the Commandant, Navy Yard, Portsmouth, New Hampshire, who had issued the appropriate operation plan and order. Diving stations were manned by a specially detailed trial crew, selected from the whole crew because of known ability and former experience in submarines.

When the proper sea area was reached the commanding officer ordered preparations made for a high speed dive pursuant to proper authority. The ship was reported rigged for diving by the assistant engineer officer aft, the torpedo officer forward, to the diving officer in the control room, who in turn reported to the commanding officer,

who thereupon ordered the signal for a quick dive, that is, from the surface condition, in diving trim, with main engines propelling the ship, on this occasion, at sixteen knots. This is an acceptance trial requirement, for which the *Squalus* was then training.

The diving signal was made, the main engines were stopped, and the single operating lever moved to the proper position for closing, by hydraulic apparatus, both the main engine air induction valve and the main hull ventilation valve. These are large valves exterior to the strength hull, which, for convenience, are hereinafter designated as valve A and valve B, respectively. Separate red and green lights were installed in the control room, to indicate, to those in control, when these valves were open and when closed. The red lights indicated open valves and green lights closed valves.

When the operating lever was moved to the proper position for closing both of these valves, the red lights, indicating that they were open, went out and the green lights came on, thereby showing, to the operating personnel, that both of these exterior valves were closed. The barometer showed an increased air pressure in the boat, further indicating that all exterior openings were closed. Such was the testimony of eye witnesses in the control room. Reliance was placed on these devices. Entering water was the first sign that some exterior opening was not closed. Either these witnesses, however honest in their convictions, were mistaken in their observations, or the instruments upon which they relied were not in proper working order, for it is established that valve A, the main engine air induction valve, either did not close or, if closed, did not remain so closed.

There is a possibility that valve A first closed, giving the light indications mentioned above, and then opened in a manner suggested by The Chief of the Bureau of Construction and Repair; but this possibility is opposed by the evidence of witnesses who testified that this exterior opening indicator light showed valve A closed when the *Squalus* was on the bottom, while water was entering. There is evidence that the green light could not have been lighted unless valve A was closed, or unless, as hereinbefore pointed out, the electric circuit was not in proper working order because, perhaps, of grounds in the circuit.

Valve B indicator lights showed valve B closed, and it was in fact closed. The motive power for closing this valve, hydraulic pressure, was supplied by the same line and was controlled by the same

operating lever that failed to close valve A. The same motion of that operating lever should have functioned to close both valves.

Divers during salvage discovered valve A open and closed it by hand from outside the boat. Inspection of the operating mechanism inside the boat by this court of inquiry, after salvage, revealed that the latch designed to keep valve A open for surface operations, while the main engines were running (accidental closure would result in serious and probably fatal injuries to personnel in the engine room) was in the latched open position.

Thus it is clear that the primary cause of flooding the *Squalus* was a failure of valve A to close. The court of inquiry was of opinion that the failure to close was occasioned by a mechanical failure in the operating mechanism controlling that valve. On that operating mechanism there was a check valve in the hydraulic line designed to permit the safety latch to become clear before the main operating cylinder received pressure. There was no such safety latch or check valve in the mechanism operating valve B.

After salvage, and on test with pressure supplied by a hand pump, the main engine and hull ventilation induction valves operated properly. On a shop test of the operating mechanism of valve A, with the above described latching cylinder check valve removed, the court found that the mechanism could not be operated by hydraulic pressure. The inference is that a leaky or stuck check valve would prevent a functioning of the mechanism. A few weeks later additional tests of this mechanism were made at the Portsmouth Navy Yard. These tests were designed to more closely approximate service conditions and the results throw some doubt on the court's finding. However, these tests do not conclusively overcome the evidence on which the finding is based.

Water entered the *Squalus* through valve A, piping behind it and outlets therefrom into the hull. The pipe lines from valve A lead to the forward and after engine rooms. Those from valve B lead to the compartments above the after battery. These lines are exterior to the strength hull. They enter it and terminate at the points indicated. The two systems of piping, i.e., engine air induction (closed by valve A), and hull ventilation induction (closed by valve B), are cross connected through non-watertight, non-pressure-proof dampers. Thus a failure either of valve A or of valve B to close would necessarily result in flooding both systems of piping.

At the four points of entrance into the hull of these systems of piping, i.e., one in the forward engine room, one in the after engine room, and two in the compartment above the after battery, hull stop valves are provided. These stop valves back up valves A and B by closing the air piping at points of entry into the pressure hull. Specifications for these hand operated hull stop valves require that they be capable of being closed in fifteen seconds, and practice shows that they can be closed in much less time (six or seven seconds). Had these hull stop valves been closed prior to submergence of valve A, which normally will occur in not less than 35 seconds after commencement of the dive, only the pipe lines, and not the compartments, would have been flooded.

The two hull stop valves backing up valve A cannot be closed when submerging until the engines to which they supply air are stopped. The engines while in operation require such a large quantity of air that in a few seconds a partial vacuum would be created in the engine rooms with serious and probably fatal injuries to personnel, if the air supply lines be closed with the engines running.

The two hull stop valves backing up valve B (and through cross connections backing up valve A) may be closed when the submarine is rigged for diving, should be closed when submerging, and may be opened while submerged when recirculation of air becomes desirable, if valves A and B are closed.

The organization and orders on the *Squalus* required closure of the two hull stop valves backing up valve A, when diving, after the engines were stopped. Likewise, they required, on rig for diving, that the two hull stop valves backing up valve B be tested free for closing, that they be closed on the diving alarm, and that they be reopened when normal submerged condition was reached.

There is no survivor to testify as to the failure to close the two hull stop valves in the main engine air induction system. The court found that an unsuccessful attempt was made to close one of the hull stop valves on the ventilation system in the after battery compartment. A survivor, whose duty it was to close these two hull stop ventilation induction valves, testified that he tried to close one of them but that it was jammed open. There is no evidence adduced that these two hull stop ventilation induction valves were tested when rigging for diving to see if they were free for closing as required by the ship's orders. These valves were first closed after the

disaster, by divers, from the outside, during the salvage operations. No mention is made in the record of any difficulty experienced in closing them.

The court of inquiry found as facts, among others—

“That the vessel was properly organized and officers and crew stationed in accordance with requirements for acceptance trials and good submarine practice.

“That prior to this dive the vessel was properly rigged for diving and was so reported to the Commanding Officer.

“That all operating gear was found to be in the correct position for diving with the exception of the operating gear of the main engine induction valve which was latched wide open.”

and inter alia, expressed as its opinion:

“The U.S.S. *Squalus* was lost due to a mechanical failure in the operating gear of the engine induction valve.

“This mechanical failure was not discovered in time, due to either an electrical failure in the valve indicator or a mistake in reading this indicator by the operating personnel.

“No offenses have been committed and no serious blame has been incurred.

“The officers and crew of the U.S.S. *Squalus* were well trained and efficient.”

The foregoing findings of fact are supported by evidence, but are not complete in all respects. The opinions are those of senior officers, two of whom are submarine officers of long experience. However, in view of the evidence adduced, and the endorsements hereon, the Secretary of the Navy holds that the sinking of the *Squalus* was primarily due to the mechanical failure of the operating gear of the main engine air induction valve and also to the non-closure of four hull stop valves, hereinbefore described.

The record shows that the closure of all hull stop valves was prescribed as routine procedure in the *Squalus*. The facts remain, however, that these four hull stop valves were open when the ship made her last dive and that evidence was adduced that it was not the practice always to close these valves.

Although the failure to close the two hull stop valves in the main engine air induction system may have been the result of special cir-

cumstances known only to the personnel who died at their posts of duty in the forward and after engine rooms, there is no adequate explanation of the failure to close the two hull stop valves in the after battery compartment. This, together with the fact that a substantial doubt remains as to the habitual practice of closing the hull stop valves, indicates that the training, supervision and indoctrination, necessary to insure the timely closure of these important hull stop valves, while diving, was lacking in emphasis.

In view of all the circumstances, the Secretary of the Navy approves the first recommendation of the court, namely, that no further proceedings be taken against any officer or member of the crew of the U.S.S. *Squalus*. Personnel recommendations of The Chief of Naval Operations and of The Chief of the Bureau of Navigation are approved.

In accordance with The Chief of Naval Operations' letter Op-23C-MJM, SS/S1(391002) dated October 2, 1939, approved by the Acting Secretary of the Navy on October 3, 1939, the recommendations of the court numbered 2 to 8, inclusive, relating to design and material, will be the subject of separate consideration and action.

From the evidence adduced the death of the following named officer and men is held to have been incurred in line of duty and not as a result of their own misconduct:

Joseph H. Patterson, ensign; James A. Aitken, fire controlman, third class; John J. Batick, electrician's mate, first class; Joshua Casey, fireman, first class; John A. Chesnutt, chief machinist's mate; Robert L. Coffey, electrician's mate, second class; Elvin L. Deal, machinist's mate, second class; Lionel H. Fletcher, electrician's mate, third class; Kenneth R. Garrison, chief machinist's mate; Robert F. Gibbs, torpedoman, first class; John P. Hathaway, fireman, first class; Eugene A. Hoffman, machinist's mate, first class; Alexander B. Keegan, seaman, first class; John P. Marino, seaman, second class; Huie K. McAfee, electrician's mate, second class; Alfred C. Priester, torpedoman, second class; Frank H. Schulte, machinist's mate, second class; Bascom S. Scyphers, electrician's mate, first class; Sherman L. Shirley, torpedoman, first class; Jack J. Strong, machinist's mate, first class; John M. Thomala, machinist's mate, first class; Robert P. Thompson, ship's cook, third class;

Marion L. Ward, radioman, third class, and Robert R. Weld, fireman, second class.

Subject to the foregoing remarks, the proceedings, findings, and opinion of the court of inquiry in the attached case, and the endorsements on the record by the bureaus and offices concerned, are approved.

(Signed) CHARLES EDISON,
Secretary of the Navy.

