U.S.S. NECHES

LOST BY SUBMARINE TORPEDO ATTACK

January 23, 1942

Class.	Oiler (AO5)	Length (B.P.). . . .	455'
Launched	June, 1920	Beam.	56'
Displacement (when attacked) .	15,650 tons	Drafts (when attacked)	
		Forward	28'-4"
		Aft	27'-10"
		Mean.	28'-1"

References:

(a) C.O. NECHES conf. ltr. to C.N.O., A16-3(3), of January 28, 1942.

(b) C.O. NECHES conf. ltr. to Buships, C-AO5/L11-1, of January 29, 1942.

Narrative

1. U.S.S. NECHES left Pearl Harbor late in the afternoon of January 22, 1942. The ship was fully loaded and provisioned. The mean draft was about a foot deeper than the tropical loading of 27'-1" established by the Chief of Naval Operations,* a condition accepted by the Commanding Officer from considerations of trim. By about 0300 in the morning of January 23, the ship was approximately at 21°-01' N, 160°-06' W, on course 268, speed 12 knots.

2. The sea was smooth with a slight swell. The weather was clear; starlight dim, no moon. An unexpected dark object (such as an unlighted submarine) might have been discerned at 500 to 1000 yards. The ship was in Material Condition Baker with all watertight openings closed below the main deck except those noted in paragraph 17.

3. Observers on the bridge, the fantail, and in the fireroom reported a heavy thud at 0310. It was later decided that this was caused by a torpedo which struck the starboard side near amidships and failed to explode. At 0319 the ship was struck by a torpedo which exploded on the starboard side abaft the engine room, at about frame 175 and about 20 feet below the waterline (see Plate I). The lookout aft reported that he saw the torpedo track nearly parallel with the wake of the ship.

4. The ship was thrown into a violent flexural vibration. Masts and rigging whipped fore and aft. Light and electric power failed. Compartments aft of bulkhead 166 were wrecked and flooded. The engine room flooded despite attempts to control flooding with both the main circulators, and was secured and abandoned at about 0323. There was no damage or flooding in the boiler room, which was secured at about 0325.

5. This flooding resulted in a starboard list of 2 to 3 degrees and a trim by the stern sufficient to cause initial flooding over the second deck aft. Had no further damage occurred, the ship would doubtless have remained afloat.

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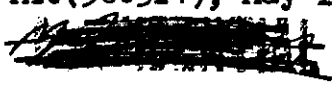
* See C.N.O. letter OP-38-F-MTU(380514), May 14, 1938.



6. Dim lights and the outline of a submarine were observed to port at about 0328, and a torpedo track was reported. The torpedo struck the port side forward between frames 25 and 30 at 0330 and exploded. Again the ship whipped violently. Two men from the gun crews on the forecastle were thrown overboard. Fire was opened on the submarine by the two 5" guns and the 3" gun on the port side, and continued until about 0335, when the list to starboard made it impossible to depress the guns sufficiently. The submarine fired twice at NECHES and missed.

7. Compartments between bulkheads 15 and 31 flooded rapidly. The ship slowly settled forward and the list to starboard increased steadily. During the next hour, the main deck became awash forward and it was apparent that the ship would capsize. The order to abandon ship was given at 0430. The list at that time was between 35 and 40 degrees. The ship sank at 0437 and was on a level keel with a list of about 45 degrees as she went down. Apparently the cargo and bunker tanks were not ruptured, as only a light film of oil remained on the surface.

Notes on Explosions

8. The torpedoes were evidently air-driven and fitted with contact firing devices. There may have been one dud, as noted in paragraph 3. There is no reliable information at hand regarding the weights of charge in Japanese submarine torpedoes. They must have been small, judging by the extent of flooding.

9. Each explosion had a loud but dull sound. A reddish-yellow flash was observed from the second. Great volumes of acrid white smoke followed each explosion. Fumes in main and poop deck compartments aft increased the difficulties of exit from and investigation of these areas. No fragments or fragment penetrations were observed.

10. The explosions were near the forward and after magazines, which evidently flooded so quickly that there was no danger of magazine explosions. There was no fire. It was most fortunate, from this standpoint, that the torpedoes struck the ends of the ship and not in way of the cargo oil or gasoline tanks. There have been many instances of torpedoed tankers bursting into flames, with few if any survivors. On the other hand, when tankers are hit in way of cargo tanks rather than at the ends, there is more chance of saving the ship, or of salvaging her if abandoned because of fire.

Shock Effects

11. The violent flexural vibration of the ship caused by each explosion has been mentioned above. Observed damage resulting from the shocks included the following items:

(a) Electric power and lighting failed, presumably because breakers tripped. (N.B. - the generators may have failed, but this is not regarded probable as other machinery seems to have kept running.)

(b) All internal communication systems failed. It was not even possible to communicate by voice tubes.

(c) The steering gear was inoperative, probably because of broken telemotor lines.

(d) The fire main and the flushing line (or both) were ruptured in B-102, port side of main deck aft.

(e) The gyro tumbled, probably because power failed.

(f) The 24-inch searchlight mounted on the tower aft was thrown to the boat deck. It landed on and wrecked the after steering station.

(g) No. 2 boom fell on the gig and prevented its use when the ship was abandoned. It sank with the ship.

(h) Furniture and fittings were thrown about, glass broken, and apparently a good deal of such minor damage occurred which could not be observed under the circumstances.

(i) The main radio transmitters and receivers were out of action.

Engineering and Communications

12. The following remarks are taken from the references, in addition to the shock effects noted above:

(a) Circulator suctions were shifted to the main drain. By the time this was done, the engine cranks were throwing water and the engines were then stopped.

(b) There were no breaks in steam or water lines in the engineering spaces.

(c) No racing of the engines was reported. Damage to shafting and propellers could not have been serious. This indicates that the torpedo carried a small charge, as the first explosion was quite close to the starboard shaft.

(d) There was no damage or flooding in the boiler room. Steam was kept normal at 200 lbs. and burners cut out as the engines stopped. About six minutes after the first explosion, the remaining burners were cut out. Boiler stops were closed and then opened half a turn to provide steam for the blowers. Safety valves were not deliberately lifted because the noise of escaping steam might have aided the submarine in locating the ship. Apparently they did not blow off later.

(e) The gasoline-driven TM radio set was in operation sometime after the second explosion. This is believed to be an early type of emergency transmitter of about 100 watts. A distress message was sent out. The gasoline engine then heated up and stopped.

Structural Damage

13. No observations of external damage to the hull were of course possible.

14. The first explosion ruptured the after engine room bulkhead. The break was close to the engine room bilges, a little to port of the centerline. It was also reported that water entered the engine room from under the evaporators, so perhaps the inner bottom was fractured. Structure below the second deck was probably destroyed as indicated on Plate I.

15. The second deck was bulged upwards. It may have been ruptured in C-201, and probably was; but this compartment flooded rapidly and there were no survivors from it. The main deck was bulged upwards in the area between frames 173 and 180. The distortion was such that the hatch at frame 177 could not be closed. A hole 3 to 4 feet in diameter was observed in the deck near this hatchway, as indicated on Plate I. The poop deck was also bulged upwards, but only slightly.

16. Even less can be said about structural damage caused by the second explosion. The compartments forward had been secured between explosions. The Commanding Officer saw a flash venting from the main deck hatch at frame 30, which was blown off. It was reported that other hatches were blown off as noted on Plate I, and that the coamings were badly distorted and covers torn from their hinges. The compartments between bulkheads 15 and 31, below the second deck, were undoubtedly wrecked, and bulkhead 31 must have been ruptured. The main deck was bulged upwards.

Condition of Access Openings and Remarks on Venting

17. All watertight hatches and doors in and below the main deck were closed before the first explosion, except certain ones authorized for access, as follows:

(a) One door to the forecastle.

(b) The hatch in the main deck at frame 26, connecting the crew's quarters on the second deck with the crew's washroom on the main deck.

(c) One door between A-202 and A-203 on the second deck.

(d) The port hatch in the second deck at frame 41, leading to the cargo storeroom A-303 on the first platform deck. (N.B. It is not clear why this hatch was open unless men were berthed in A-303. There were 64 more enlisted men aboard than in the specified complement.)

(e) The hatch in the main deck at frame 177.

(f) The hatch in the main deck at frame 183.

18. All other watertight doors below the main deck were dogged tight all around. The other hatches in and below the main deck were secured by two dogs opposite the hinges, or by one dog in the case of small hatches. This light dogging of hatches was done to facilitate venting of underwater explosions, according to the references.

19. The first explosion is known to have blown open the large hatch in the main deck at frame 165. There was not much pressure at this point, because the hatch latched itself open in the position and there was apparently no difficulty in closing and dogging it tight afterwards. It is quite likely that the hatch in the second deck at frame 177 (which was lightly dogged) was blown off with considerable violence. This could have knocked out the hole found in the main deck overhead. The nearby hatch in the main deck was open (item (e) in paragraph 17), but the coaming was so distorted that it could not be closed. The other open hatch in the main deck (item (f) in paragraph 17) was readily closed.

20. This case illustrates the reasons for dogging hatches securely. If the hatch in the second deck had been firmly dogged, the second deck might have distorted more, but the hatch might not have blown off and holed the main deck above (assuming that this occurred). Reduced blast in C-201 might have limited distortion of the main deck so that the open hatch at frame 177 could have been effectively closed. There would then have been no flooding over the main deck aft (since the hull was tight up to the poop deck). Flooding on the second deck would also have been less if the main deck were airtight. Trim by the stern would have been less and damage control would have been much facilitated.

21. All doors and hatches forward (items (a) to (d), paragraph 17) were secured before the second explosion. The hatches in the second deck in A-303 and A-302 were reported blown open. The three main cargo hatches in the main deck were blown from their hinges. Doubtless all hatches below the second deck in this vicinity were also blown open. Again it can be argued that the hatches on the main deck would not have blown off if they (and the hatches beneath) had been firmly dogged. The main deck might have remained tight and the rising water held down by the entrapped air (assuming vents closed, as most were by the damage control party).

22. The practice of lightly dogging hatches and doors originated in the British Navy. The Bureau of Ships commented unfavorably on it in a letter to the Chief of Naval Operations on August 18, 1939. The theory that encouragement of "venting" an explosion by leaving certain doors and hatches open or lightly dogged limits damage has been pretty well discredited by experience. The practice has since been abandoned in the British Navy, and instructions issued that watertightness up to 8 feet above the waterline is more important than any venting of explosions. Moreover, it often appears that venting does more harm than good by exposing more regions to blast damage. The practice was further condemned in the Chief of Naval Operations letter Op-22-D (SC) S88, Serial 047222, of May 8, 1941, on the subject of Damage Control, addressed to the Forces Afloat.

Liquid Loading Before Damage and Subsequent Flooding

23. The ship was fully loaded, as stated in paragraph 1. The liquid cargo was:

Oil fuel.....	45,000 barrels
Diesel Oil.....	8,700 barrels
Gasoline.....	100,000 gallons (remainder of gasoline tankage filled with sea water)

Bunker tanks were over 90% full. There were about 65,000 gallons of fresh water in the peak tanks (capacity 75,000), and 50,000 gallons on the reserve feed tanks (capacity 76,000).

24. The flooding after damage has been fairly well covered in previous paragraphs, but is recapitulated here for convenience in reference:
Flooding aft: All compartments between bulkheads 166 and 178 flooded at once. Shortly after the first explosion, water was seen to be waist deep in C-201 on the second deck. C-202 flooded through the doors in bulkhead 178, which were closed but reported sprung by the explosion. The engine room flooded rapidly. Water initially reported on the main deck came from broken piping (paragraph 11). It is not certain that water from below reached the main deck before the second explosion.
Flooding forward: All compartments between bulkheads 15 and 31, up to and over the second deck in A-202, flooded at once. Some compartments abaft bulkhead 31 probably flooded at once, and others more slowly during the final hour.

Comments on the Loss of the Ship

25. The Commanding Officer's reports are excellent, and enable the circumstances and attendant difficulties to be visualized fully. Data available are naturally not sufficient for a thorough analysis.

26. The heavy loading of the ship penalized her from the start. The inclining experiment (made in 1921) indicates a metacentric height of some four feet. But the summer tanks are fitted as cargo spaces and storerooms; and if these spaces were filled with equipment and stores, the stability might be appreciably less. Incidentally, it is important to note that these older oilers, A01 to A06, have less initial stability than later oilers of the summer-tank type (A07 to A021).

27. The starboard list produced by the first explosion was very small, but the free surfaces on the second deck and in the engine room caused losses in the stability. The second explosion produced an increasing list to starboard, although the torpedo struck the port side. The list could scarcely have been due to unsymmetrical flooding, and must therefore have been caused by negative stability.

28. The most reasonable explanation of the steadily-increasing starboard list seems to be that flooding forward was progressive, and that free surfaces appeared in successive compartments and perhaps on successive decks. A large part

of the main deck was awash before the ship finally sank. The metacentric height became increasingly negative, and equilibrium was reached at increasing angles of heel. It is to be noted that the ship did not capsize or plunge, but sank evenly. All indications point to negative stability. This is most unusual in damaged tankers. If the summer tanks on the starboard side had flooded, either from the sea or by oil from the main cargo tanks, the explanation of the list would be much simpler. But it is difficult to imagine how such flooding could have been caused, and there is no suggestion of it in the references.

29. There remains the question of pumping. The cargo pumps were outboard of the boiler room to starboard. The space was almost certainly dry after the first hit. Steam could have been supplied. The two pumps, at rated combined capacity of 6000 gallons per minute, could have pumped a cargo oil tank in about half an hour, or about 600 tons of oil. But the circumstances were against pumping cargo at any time. No watch was kept in the cargo pump room. Further, the men assigned to this station were among those berthed in C-201, all of whom were killed. The boiler room was secured within a few minutes after the first explosion. Access to the cargo pump room was via a trunk opening on the second deck and terminating in a skylight on the main deck. By the time the situation was realized, the starboard side of the main deck was reported awash aft. The pump room trunk might have been reached by a circuitous route on the second deck from an escape scuttle on the port side of the main deck; but in the rising water and darkness this step would have been difficult to investigate and carry into execution.

30. Pumping cargo, however, would not have saved this ship if, as the circumstances indicate, the metacentric height became negative. It would have been correct to pump after cargo tanks following the first hit, which would have restored buoyancy and reduced trim aft. The ship evidently had enough stability to permit this. But pumping after the second hit would probably have been futile. It would have created free surfaces in cargo tanks which might have hastened the end. This is an unusual case, and generalizations from it are dangerous.

31. The following points of general interest emerge from this discussion:

(a) Overloading of tankers may result in reducing the reserve of stability to a dangerously small value, aside from the adverse effect on the reserve of buoyancy and the increase in structural strains.

(b) Secure watertight doors and hatches firmly, using all dogs. Do not try to "vent" explosions. It is unsound and increases rather than diminishes risk.

(c) It is suggested that cargo pump rooms be considered General Quarters stations, so that the pumps will be manned in an emergency.

(d) Sound-powered telephones should be provided from the bridge to the engine and boiler rooms, and to damage control stations forward and aft.

(e) Access to pump rooms should be trunked at least to an entrance point on the main deck and higher if local structure permits. A watertight door could also be installed to advantage between the boiler and cargo pump rooms in ships of this type. These watertight wing spaces abreast the boiler room may protect the single boiler room of such ships from flooding under some circumstances of attack, and therefore their boundaries should not be pierced by non-watertight closures; but watertight doors in the wing bulkheads would provide direct emergency access to the pumps which might prove decisive in saving the ship.