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⑨ BUREAU OF SHIPS GROUP
TECHNICAL INSPECTION REPORT

U NO. 36747

⑥ OPERATION CROSSROADS,
U.S.S. DENTUDA (SS335).

TEST BAKER U.S.

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⑩ C. L. Gaasterland.

Director
Defense Atomic Support Agency
Washington, D. C. 20301

⑪ 1947,

⑫ 89 p.

⑭ XRD-115 OPERATION CROSSROADS

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TECHNICAL INSPECTION REPORT**

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USS DENTUDA (SS335)

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U.S.S. DENTUDA (SS335)

SHIP CHARACTERISTICS

Building Yard: Electric Boat Company.

Commissioned: 30 December 1944.

HULL

Heavy Hull Construction.

Length Overall: 311 feet 9 inches.

Length (between perpendiculars): 307 feet 0 inches.

Beam (extreme): 27 feet 3 inches.

Beam (molded): 26 feet 0 1/2 inches.

Height (lowest point of keel to top of periscope supports): 47 feet 4 inches.

Drafts (at time of test): Submerged.

Standard Displacement: 1525 tons.

Displacement (at time of test): 2426 tons.

MAIN PROPULSION PLANT

Main Engines: Four General Motors, 16 cylinder,
Type 16-278A.

Auxiliary Engine: General Motors, 8 cylinder,
Type 8-268.

Main Motors and Generators: General Electric.

Main Storage Battery: Exide.

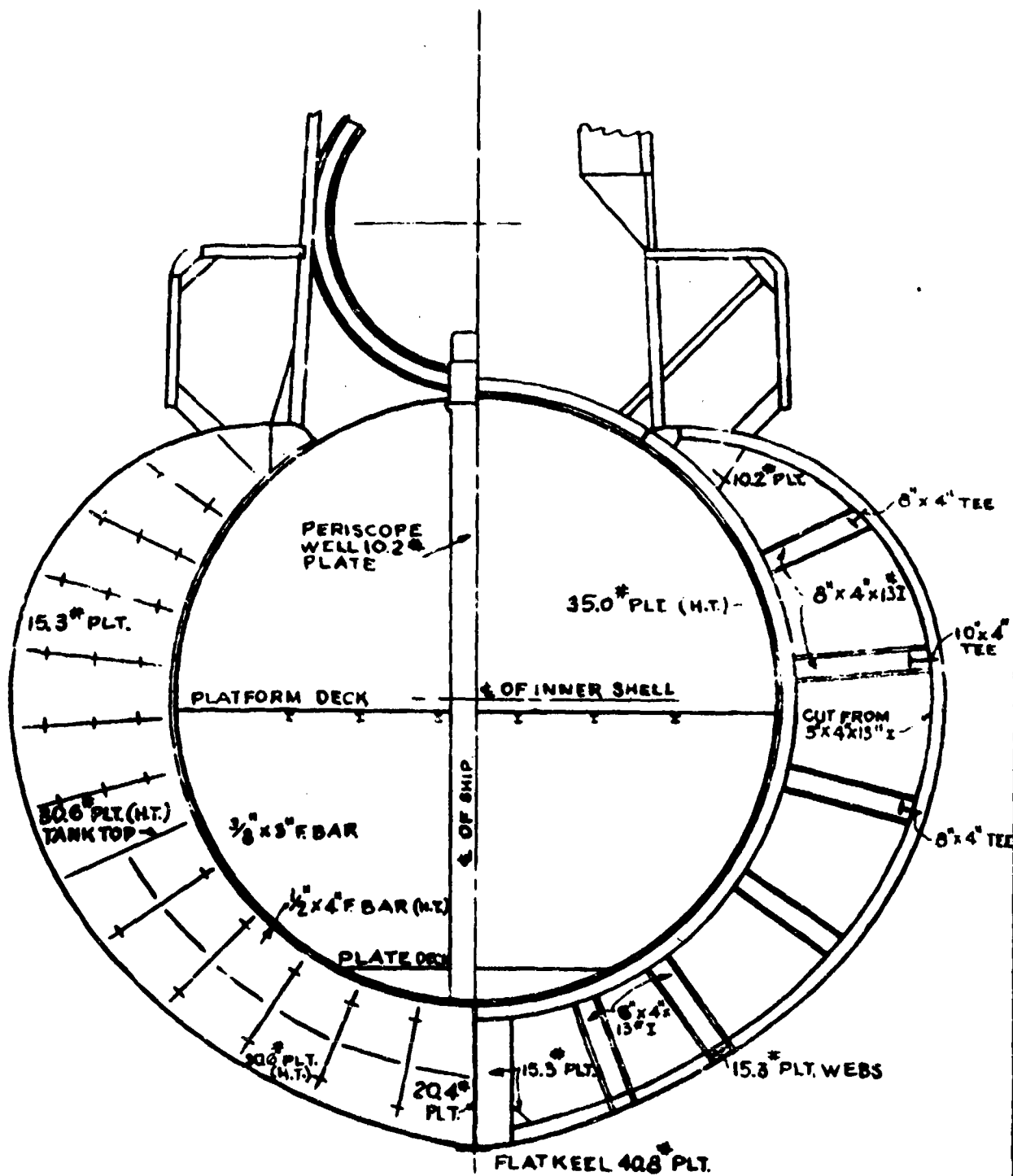
Main Controls: General Electric.

Reduction Gears: General Electric.

Diesel Electric Drive.

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FRAME 52 FRAME 49
 LOOKING FORWARD

TEST B

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U.S.S. DENTUDA (SS 335)

TECHNICAL INSPECTION REPORT

OVERALL SUMMARY

I. Target Condition After Test.

(a) Drafts after test; list; general areas of flooding, sources.

The DENTUDA was submerged for Test B on Baker minus two day in 28 fathoms of water to a keel depth of approximately 80 feet at a range of approximately 1500 yards from the center of the burst. Her drafts, immediately before submerging were 18' - 0" forward and aft and her list one half degree to starboard. On Baker plus two day the ship, which was found on the bottom, was surfaced using normal procedure. The stern surfaced first and the ship had a momentary down angle of about thirty degrees. The drafts upon surfacing were 20' - 6" forward and 18' - 6" aft.

The pump room was flooded to the level of the control room floor plates by way of the ten pound blow lines from No. 6D Main Ballast Tank. The conning tower bilges and No. 2 periscope well were flooded, apparently via the No. 2 periscope stuffing box. The two engine induction lines, but not the hull induction line, were partially flooded, apparently as a result of slow leakage through the outboard induction valve.

(b) Structural damage.

There is no structural damage. The hull was carefully examined in drydock during November 1946 and no damage was found which could be attributed to Test B. Bore sighting of the forward torpedo tubes showed that there is no significant distortion of the bow.

(c) Other damage.

All main propulsion machinery was operable when tested. Flooding of the pump room rendered the following auxiliaries inoperative:

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- (1) Trim pump motor.
- (2) Drain pump motor.
- (3) 10 lb. blower motor.
- (4) Hydraulic plant motor (2).
- (5) Gyro motor-generator sets (2).
- (6) Ice machine motor.
- (7) Air conditioning plant motors (2).
- (8) High pressure air compressor motors (2).
- (9) I. C. Motor-generator sets (2).
- (10) I. C. Motor-generator panels (4).

The steep down angle of the vessel on surfacing caused water to run forward flooding the lower half of the I. C. Switchboard in the control room, covered the auxiliary gyro compass, and at least heavily splashed, or perhaps momentarily flooded, the extreme lower portion of the master gyro compass panel just aft of the I. C. Switchboard.

An inboard fuel oil vent valve beneath the galley sink in the line leading from the fuel oil filling and transfer line on the port side to Fuel Ballast Tank 3A on the starboard side was found partially open on re-entry. Oil had leaked out and run across to the starboard side and aft in the waterway. Some oil leaked into the battery well and into four cells in the forward end of the after battery. The lower two rows of jars were immersed to a depth of 36 inches, the middle two rows on either side to a depth of 28 inches, and the upper two rows on either side to a depth of 12 inches. Oil leaking through openings in the waterway and behind the lining of the meat and cold rooms soaked the insulation in these spaces. See photograph on Page 41 for view of effect of fuel oil on the rubber battery tank lining.

II. Forces Evidenced and Effects Noted.

(a) Heat.

There is no evidence of heat.

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(b) Fires and explosions.

There is no evidence of fires or explosions.

(c) Shock.

Shock probably jarred open hull flapper valve in 10 lb. blow line to No. 6B - 6D main ballast tank and possible jarred open a test cock in fuel oil filling and transfer line in after battery compartment. The tail stops of loaded torpedo tubes were found backed off a partial turn. No evidence of damage to machinery from shock was noted and loose gear was not disarranged.

(d) Pressure.

The "Coordinator's Report on Air Blast and Water Shock, Tests A and B" of 17 September 1946 indicates the peak pressures were much less than 800 lbs. per square inch. More accurate data is not now available.

(e) Any effects apparently peculiar to the atom bomb.

None other than radioactivity. Outside the pressure hull, the structure was moderately radioactive. Inside the pressure hull, radioactivity was below tolerance.

III. Effects of Damage.

(a) Effect on machinery, electrical and ship control.

There was no effect on propulsion equipment. Those circuits affecting ship control which run through the I. C. switchboard were out of commission due to the flooding damage to that switchboard. Flooding of the main hydraulic power plant motors prevented hoisting periscopes or operating vent valves, torpedo tube outer doors, etc. by hydraulic power.

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(b) Effect on gunnery and fire control.

Own Ship's Course feed to the Torpedo Data Computer was out of commission due to inoperability of the master gyro compass. 120 volt A. C. circuits coming through the I. C. switchboard to instruments indirectly affecting fire control were out of commission.

(c) Effect on watertight integrity and stability.

The watertight integrity of the control room was destroyed as a result of valve failures. No structural material is involved. The water in the No. 2 periscope well and conning tower bilges is estimated at two tons, which is believed to have entered through the stuffing box of No. 2 periscope. No worthwhile estimate of the amount of water in the induction lines is available but it is believed to have been relatively minor. Neglecting this induction leakage, the effect of the remaining flooding is calculated to have reduced the transverse metacentric height by approximately 0.25 feet (17.5%) and the reserve buoyancy by 18%. Had the ship been manned, all flooding could have been stopped immediately.

(d) Effect on personnel and habitability.

It is considered that there would have been no effect on personnel as a result of hull damage. Had the ship been manned, flooding would have been prevented and there would be no effect on habitability. This excludes radiological effects.

(e) Total effect on fighting efficiency.

With personnel on board, the fighting efficiency of the ship would have remained at 100%.

IV. General Summary of Observers' Impressions and Conclusions.

The DENTUDA received no major damage as a direct result of the Test B atom bomb. Had the ship been manned, the secondary damage resulting from flooding would not have occurred. For general views of the DENTUDA after the test, see photographs on pages 42 to 48.

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V. Preliminary recommendations.

Install a more positive "locked-closed" device in the hull flapper valves in the ten pound blow lines.

Where practicable, controllers and associated control equipment for rotating electrical equipment should be located in the same watertight compartment with the rotating equipment. Duplicate equipment should be located in separate compartments.

Starter panels, feeder and junction boxes should be held to a minimum in the pump room.

TECHNICAL INSPECTION REPORT

SECTION I - HULL

GENERAL SUMMARY OF HULL DAMAGE

I. Target Condition After Test.

(a) Drafts after test; list; general areas of flooding, sources.

The DENTUDA was submerged for Test B on Baker minus two day in 28 fathoms of water to a keel depth of approximately 80 feet. Her drafts, immediately before submerging were 18' - 0" forward and aft and her list one half degree to starboard. On Baker plus two day the ship, which was found on the bottom, was surfaced using normal procedure. The stern surfaced first and the ship had a momentary down angle of about thirty degrees. The drafts upon surfacing were 20' - 6" forward and 18' - 6" aft.

The pump room was flooded to the level of the control room floor plates by way of the ten pound blow lines from No. 6D Main Ballast Tank. The conning tower bilges and No. 2 periscope well were flooded, apparently via the No. 2 periscope stuffing box. The two engine induction lines, but not the hull induction line, were partially flooded, apparently as a result of slow leakage through the outboard induction valve.

(b) Structural damage.

There is no structural damage. The hull was carefully examined in drydock during November 1946 and no damage was found which could be attributed to Test B. Bore sighting of the forward torpedo tubes showed that there is no significant distortion of the bow.

(c) Other damage.

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A 1/4" vent valve in the fuel oil transfer line in the galley was jarred open, permitting fuel oil to flood the deck of the galley, the crew's berthing and messing space to a depth of about 10 inches. Some of this oil found its way into the after battery tank where it attacked the rubber tank lining and the cell cases. Some of the oil leaked through openings in the waterway and thence down behind the lining and insulation of the meat and cool rooms. Nearly all of the cork insulation in these spaces is worthless as a result of being oil soaked.

II. Forces Evidenced and Effects Noted.

(a) Heat.

No evidence.

(b) Fires and explosions.

No evidence.

(c) Shock.

No hull equipment shows evidence of other than negligible shock. Several small valves were found partially open as discussed elsewhere, and the tail stops of loaded torpedo tubes backed off a partial turn.

(d) Pressure.

The "Coordinator's Report on Air Blast and Water Shock, Tests A and B" of 17 September indicates the peak pressure were much less than 800 lbs. per square inch. More accurate data is not now available.

(e) Effects apparently peculiar to the Atom Bomb.

Aside from radioactivity, no peculiar effects were noted.

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III. Effects of Damage.

(a) Effect on machinery, electrical, and ship control.

There is no effect on hull material except that the flooding of the main hydraulic power plant motor prevents hoisting the periscopes by normal methods.

(b) Effect on gunnery and fire control.

None except for electrical equipment.

(c) Effect on watertight integrity and stability.

The watertight integrity of the control room was destroyed as a result of valve failures. No structural material is involved. The water in the No. 2 periscope well and conning tower bilges is estimated at two tons, which is believed to have entered through the stuffing gland of No. 2 periscope. No worthwhile estimate of the amount of water in the induction lines is available, but it is believed to have been relatively minor. Neglecting this induction leakage, the effect of the remaining flooding is calculated to have reduced the transverse metacentric height by approximately 0.25 feet (17.5%) and the reserve buoyancy by 18%. Had the ship been manned, all flooding could have been stopped immediately.

(d) Effect on Personnel and Habitability.

It is considered that there would have been no effect on personnel as a result of hull damage. Had the ship been manned, flooding would have been prevented and there would be no effect on habitability. This excludes radiological effects.

(e) Total Effect on Fighting Efficiency.

With personnel on board, the fighting efficiency of the ship would have remained at 100% insofar as hull material is concerned.

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IV. General Summary of Observers' Impressions and Conclusions.

Considering material only, it is believed that this ship would not have suffered any significant damage as a result of Test B had her crew been on board.

V. Preliminary Recommendations.

None.

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DETAILED DESCRIPTION OF HULL DAMAGE

A. General Description of Hull Damage.

(a) Overall condition of vessel.

The pressure hull structure is intact and undamaged. No serious damage to any other item of hull cognizance has been observed.

(b) General areas of hull damage.

There is no significant damage.

(c) Principal areas of flooding with sources.

The pump room flooded to the level of the control room deck. When the ship was reboarded after Test B, the hull flapper valves for Nos. 6B and D and 7 main ballast tanks (which are operated from the control room) were found to have been jarred open. Prior to the test, these valves were closed and latched. No other source of flooding was found. Subsequent tests and examination at Mare Island of the outboard 10 lb. blow piping for Main Ballast Tanks 6B and D, and for main ballast tank 7 showed that the 2-1/2" gate valve (pc: V-983 on Electric Boat Company Plan 2476-28) for main ballast tank 6D leaks 0.9 gals. per minute under a 70 lb. per square inch head. See photographs on Pages 49 and 50. While such a rate would account for only about half of the water found in the DENTUDA's pump room, no other definite source of leakage can be found. It is possible that the check valve in the 10 lb. blow line to main ballast tank No. 7 failed to seat at the time of the test and that consequently water from main ballast tank No. 7 augmented that from 6D. However, subsequent tests of this valve showed no appreciable leakage.

A 15 lb./in.² air test was put on the 10 lb. system between the hull flapper valves and the lower flapper in the list control manifold, with no leakage. Therefore, the path of flooding suggested above (through the 10 lb. blow lines to main ballast tanks 6D and possibly 7) is acceptable only with the added assumption that the 1" globe type drain valve in the drain line from

the list control manifold to the pump room bilges was jarred open. (There is no record of the position of this valve upon reboarding after Test B.)

(d) Residual strength, buoyancy and effect of general condition of hull on operability.

Residual strength is not effected. The reserve buoyancy was reduced about 18% by the flooding of the pump room and conning tower bilges. Hull damage does not effect operability.

B. Superstructure and Weather Decks.

There is no damage.

C. Topside Ordnance Mounts.

There is no damage, except that the periscopes and radar masts can not be hoisted, due to flooding of the motors for the IMO pumps. The leakage of the No. 2 periscope gland is probably due to incorrect assembly. When disassembled at Mare Island, only the two rings of flax packing below the lantern ring were found installed. The ring of flax above the lantern ring had not been installed.

D. Torpedo Tubes and Appurtenances.

There is no damage. The bow tubes were bore-sighted at Mare Island in November 1946, and found to be exactly in line with the zero bearing of the periscope and within 1/8" of the center line bench mark established on building. After the torpedo tube rollers were removed, the bore gage passed through all bow tubes without difficulty and the shutter clearances were in excess of the specified minimums.

E. Weather Deck.

Combined with Item B.

F. External Hull Above Waterline.

There is no damage.

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G. Interior Compartments (above w.l.).

There is no damage to compartment structure or hull fittings. There was a slight leakage of the after engine room hatch and the gun access trunk door. The former has a double lip type and the latter a flat-faced gasket. Whether these closures bounced open momentarily as a result of the explosion or whether they leaked slowly but steadily cannot be determined. Other hatches, both with flat-faced and with double lip gaskets were tight.

The lining of the after battery tank is a natural rubber, type GR-S. In order to investigate the damage caused by the fuel oil in the after battery tank, six cells in the forward end were pulled. In the area uncovered, the lining on the lower level and on the forward bulkhead is badly swollen and buckled. (See photograph on page 41). The Shore "A" hardness of the swollen lining is 35 as compared with 55 for unswollen lining. The rubber is also badly torn, but this is attributed to the removal of the cells rather than to the unaided action of the oil. As the specifications for battery tank linings have recently been changed to require oil resistant rubber, no further recommendations are considered necessary.

The fuel oil that covered the deck in the crew's mess also seeped through the waterway on the starboard side in way of the meat and cool rooms. From there, it worked its way down behind the sheathing of the meat and cool rooms, saturating the cork insulation. The presence of small amounts of fuel oil in the crew's mess is not too rare, and from the standpoint of economy alone, it would seem advisable to take positive steps to insure the oil-tightness of the deck.

H. Armored Decks.

None are fitted.

I. Interior Compartments (below w.l.).

Combined with Item G.

J. Underwater Hull.

There is no damage except slight denting of the sides which is believed to have been caused by striking against other ships

rather than by the atom bomb.

K. Tanks.

There is no damage to tanks. While the ship was beached at Bikini, traces of fuel oil were seen on the port side forward. Therefore, in order to locate the possible leak, all fuel oil tanks were tested at Mare Island with 15 lbs./in.² air. All normal fuel oil tanks, fuel ballast tanks 5A and B, and the Collecting and Expansion tanks showed zero drop in 10 minutes. Fuel ballast tank 4A and B had a 2 oz. drop in 10 minutes and fuel ballast tank 3A and B leaked badly through the flood valves. A careful examination of these valves revealed no damage, the leakage being due to sand and dirt in the hinges and gasket and to the usual permanent indentation found in older gaskets. It is believed that the oil traces seen at Bikini came from the forward flood valve on tank 3B which leaks the worst. Except for the flood valves, the remainder of the tank is tight under a 15 lb./in.² air test.

The flood valves for safety and negative tanks tested tight under a 5 lb./in.² internal air test.

L. Flooding.

Flooding has been discussed in previous sections. None was of such nature that it could not have been prevented had the ship been manned.

The latching device on the hull flapper valves for the 10 lb. blow system is apparently susceptible to derangement under shock. As a matter of convenience, the improvement of this latching device appears to be worthwhile. The failure of the 2-1/2" gate valve in the 10 lb. blow line to main ballast tank 6D appears to be due to faulty fitting of the disc into the seat and not to the bomb blast.

As stated above, the flooding of the periscope well is considered to be a result of improper arrangement of the packing, as no material defect could be found.

M. Ventilation.

The two engine induction lines, but not the hull in-

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duction, were partially flooded upon surfacing. The main induction valve was closed from topside by hand and was probably not as tightly closed as when operated from below. A subsequent air test of the induction system revealed no leakage and it is assumed that the water entered very slowly through an incompletely closed main induction valve.

N. Ship Control.

There is no damage to ship control stations as a result of the failure of hull material.

O. Fire Control.

There is no damage to fire control stations as a result of the failure of hull material.

P. Ammunition Stowage.

There is no damage except that the cork insulation for the magazine is partially soaked with fuel oil that leaked through from the crew's mess.

Q. Ammunition Handling.

There is no damage.

R. Strength.

There is no reduction in strength.

S. Miscellaneous.

No comment.

T. Coverings.

The linoleum in the crew's mess and living compartment is permeated with fuel oil, but does not appear to be seriously damaged.

U. Welding and Rivetting.

No failure was observed.

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TECHNICAL INSPECTION REPORT

SECTION II - MACHINERY

GENERAL SUMMARY OF MACHINERY DAMAGE

I. Target Condition After Test.

(a) Drafts after test; list; general areas of flooding, sources.

The DENTUDA was submerged to eighty feet keel depth for Test Baker. When resurfaced her draft forward was about three feet greater than normal. Though this loss of freeboard was not progressive, she was beached, and when opened up was found to have the control room compartment half flooded, thus complete flooding of pump room and storeroom. Flooding was through 10 lb. blow line to main ballast tank No. 6D. No. 2 periscope well was also flooded due to leaking periscope packing gland and the engine air induction piping was partially flooded due to slow leakage around main induction outboard valve.

(b) Structural damage.

None observed.

(c) Other damage.

All machinery is undamaged, has been tested and is operable except that in the pump room, where all electric motor prime movers were damaged by salt water from flooding. No evidence of any damage to any of the machinery in the pump room is apparent from visual examination.

II. Forces Evidenced and Effects Noted.

(a) Heat.

No evidence of unusual heat was noted.

(b) Fires and explosions.

No evidence of fires nor explosions was noted.

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(c) Shock.

Shock probably jarred open hull flapper valve in 10 lb. blow line to No. 6B - 6D main ballast tank and possibly jarred open a small vent valve in fuel oil filling and transfer line leading to No. 3 fuel ballast tank in after battery compartment. No evidence of damage to machinery from shock was noted and loose gear was not disarranged.

(d) Pressure.

No evidence of unusual pressure was noted.

(e) Any effects apparently peculiar to the atom bomb.

None other than radioactivity. Outside the pressure hull, the structure was moderately radioactive. Inside the pressure hull, radioactivity was below tolerance.

III. Effects of Damage.

(a) Effect on machinery and ship control.

Propulsion unaffected. Gyro compasses out of commission from salt water flooding.

(b) Effect on gunnery and fire control.

Electric power supply to torpedo control and firing affected by salt water flooding.

(c) Effect on watertight integrity and stability.

The watertight integrity of the control room was destroyed as a result of a valve failure.

(d) Effect on personnel and habitability.

Except for possible radiological effect, personnel would have been unaffected. Habitability affected by loss of air conditioning and refrigeration due to salt water flooding.

(e) Total effect on fighting efficiency.

Effect on fighting efficiency can be considered as nil since all damage was of secondary nature from salt water flooding which would have been prevented had the ship been manned.

IV. General Summary of Observers' Impressions and Conclusions.

The DENTUDA received no major damage as a direct result of the Test Baker atom bomb. Had the ship been manned, no salt water damage to electrical equipment would have occurred since the flooding could and would have been stopped.

V. Preliminary Recommendations.

It is believed that hull flapper valves in the 10 lb. blow lines to main ballast tanks should be supplanted by more positive gate valves, or that a more positive "locked-closed" device should be incorporated in the present flapper valve.

DETAILED DESCRIPTION OF MACHINERY DAMAGE

A. General Description of Machinery Damage.

(a) Overall condition of vessel.

Undamaged except for salt water damage to machinery in flooded pump room.

(b) Areas of major damage.

No major damage from bomb. Secondary salt water damage occurred to machinery in pump room from partial flooding of control room compartment. Some small secondary damage occurred to after battery from leakage of diesel fuel oil into that compartment.

(c) Primary cause of damage in each area of major damage.

No major damage occurred.

(d) Effect on target Test Baker on overall operation of machinery plant.

No direct effect on machinery plant was noted. All machinery in pump room is inoperative due to salt water damage to electric motor prime movers and to electric power distribution. This flooding would have been prevented had the ship been manned. Main propulsion not effected.

B. Boilers.

Not applicable.

C. Blowers.

Not applicable.

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D. Fuel Oil Equipment.

(a) Heaters.

Undamaged.

(b) Strainers.

Undamaged.

(c) Manifolds.

Undamaged.

(d) Fittings.

Undamaged.

E. Boiler Feedwater Equipment.

Not applicable.

F. Main Propulsion Machinery.

No damage.

G. Reduction Gears.

No damage.

H. Shafting and Bearings.

No damage.

I. Lubrication System.

No damage.

J. Condensers and Air Ejectors.

Not applicable.

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USS DENTUDA (SS335)

K. Pumps.

(a) Booster drain pump.

Undamaged.

(b) Circulating pumps.

Undamaged. Those in pump room apparently undamaged from inspection but not tested and inoperable due to grounded out motors from salt water flooding of pump room.

(c) Trim pump.

No apparent damage from inspection. Not tested and inoperable due to grounded out motor and starting panel from salt water flooding of pump room.

(d) Drain pump.

No apparent damage from inspection. Not tested and inoperable due to grounded out motor and starting panel from salt water flooding of pump room.

(e) Priming pump.

No apparent damage. Not tested as it is inoperable due to grounded out motor and starting panel from salt water flooding of pump room.

(f) Fuel oil pumps.

Undamaged.

(g) Lubricating oil pumps.

Undamaged.

(h) Distiller feed pump.

No apparent damage from inspection. Not tested and inoperable due to grounded out motor from salt water.

L. Auxiliary Generators.

Discussed under Item F (Main Propulsion).

M. Propellers.

No damage.

N. Distilling plant.

No damage.

O. Refrigerating and Air Conditioning Plants.

(a) Compressors.

No apparent damage noted from inspection. Not tested and inoperable due to salt water flooding of pump room and consequent grounding out of motors and control panel.

(b) Motors.

Inoperable. Grounded out from flooding of pump room.

(c) Condensers.

No apparent damages. Not tested.

(d) Foundations.

Undamaged.

(e) Refrigerant piping and cooling coils.

Undamaged.

(f) Insulation and lagging.

Undamaged except that from salt water immersion.

(g) Miscellaneous valves, switches, controls, fittings,
etc.

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All panels, switches, controls and wiring located in pump room suffered salt water immersion and were completely grounded out.

P. Winches, Windlasses and Capstans.

No damage.

NOTE: The anchor windlass and forward capstan were inoperable due to lack of hydraulic power.

Q. Steering and Diving.

No damage.

NOTE: Anchor windlass, forward capstan, and bow plane rigging inoperable in normal hydraulic power operation due to main hydraulic plant being inoperable from flooding of pump room. Also emergency operation of bow and stern planes impossible for same reason.

R. Elevators, Ammunition Hoists.

Not applicable.

S. Ventilation (Machinery).

No damage.

T. Compressed Air Plant.

This system apparently undamaged by Test Baker. High pressure air compressors and low pressure blower not tested due to salt water damage to their respective electric motors and controller panels incident to flooding of pump room. No air was lost from air banks.

U. Diesels.

Not applicable. See Item F.

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V. Piping Systems.

The only piping systems affected by Test Baker were:

(a) Main Ballast Tank Blow (10 lb.) Air Piping.

The ten pound blow piping to number 6D main ballast tank allowed partial flooding of the control room compartment, through a series of coincidences. These were: Leakage through deck operated gate stop salvage valve in the 10 lb. blow line to No. 6D main ballast tank due to defective valve which jammed before closing fully thus indicating closure; slow leakage past the check valve in 10 lb. blow line to No. 6D main ballast tank at main vent for No. 6D main ballast tank; jarring open of hull flapper valve in control room in 10 lb. blow line to No. 6B - 6D main ballast tank, probably from shock; leakage past main flapper valve at bottom of 10 lb. blow manifold which had defective latch in closed position. The control room compartment flooded to the deck level thus completely flooding the pump room. This flooding would have been prevented had the ship been manned, since it would have been noticed immediately and the hull flapper in 10 lb. blow line to 6B - 6D main ballast tank closed.

(b) Fuel oil piping.

A 3/8" vent valve in the fuel oil filling and transfer line to No. 3A fuel ballast tank in after battery compartment was partially opened about 1 1/2 turns allowing slow leakage into the compartment of an estimated 100 gallons of diesel fuel oil. Some of this oil leaked through airtight hatches into battery tank and magazines. Valve may have been jarred open by shock.

W. Hydraulic System.

This system apparently undamaged but system not tested due to damage to hydraulic pump motor, controller panels and wiring from salt water flooding of pump room.

X. Navigational Instruments.

Undamaged.

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Y. Periscopes.

- (a) Optics, bearings, train, stadimeter, etc.

No damage.

- (b) Mechanical hoist mechanism.

Undamaged. Tested by loading hydraulic accumulator with air.

Z. Radar and Sonar.

- (a) Mechanical hoisting mechanism.

Apparently undamaged. Not tested due to inoperable main hydraulic power plant.

- (b) Training mechanism.

Undamaged except for starboard sound head inoperable due to bent sound shaft as a result of beaching of ship after test.

AA. Miscellaneous.

- (a) Drill press.

Located in pump room. Damaged by salt water immersion.

TECHNICAL INSPECTION REPORT

SECTION III - ELECTRICAL

GENERAL SUMMARY OF ELECTRICAL DAMAGE

I. Target Condition After Test.

(a) Drafts after test; list; general areas of flooding, sources.

The following flooding contributed to electrical damage:

1. The pump room was flooded completely up to the control room deck. During surfacing operations the bow took a thirty degree down angle, causing water to flow into the forward part of the control room for a short time.

2. An inboard fuel oil vent valve beneath the galley sink in the line leading to fuel ballast tank No. 3A partially opened. Oil leaked into the after battery compartment and accumulated in the after well.

(b) Structural damage.

Not observed.

(c) Damage.

Flooding of the pump room rendered all electrical equipment therein inoperable. The water which entered the control room during surfacing operations soaked the lower sections of the I. C. switchboard and the master gyro and repeater switchboard, and entered the master and auxiliary gyro compasses; rendering these inoperable.

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Fuel oil contaminated three cells of the after battery. All the cells of the after battery were partially immersed in fuel oil.

II. Forces Evidenced and Effects Noted.

(a) Heat.

No evidence.

(b) Fires and explosions.

None.

(c) Shock.

There was no evidence of shock damage to electrical equipment other than slight spillage of mercury from the auxiliary gyro compass. However, shock apparently jarred open several valves, indirectly causing electrical damage when sea water and fuel oil flooded compartments.

(d) Pressure.

There was no evidence of pressure damage.

(e) Any effects apparently peculiar to the atom bomb.

None other than radioactivity.

III. Effects of Damage.

(a) Effect on propulsion and ship control.

No effect on propulsion. Ship control was impaired by loss of alternating current power supply, both gyro compasses and the hydraulic system.

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(b) Effect on gunnery and fire control.

Own Ship's Course feed to the torpedo data computer was inoperable due to loss of the master gyro compass. Fire control also impaired by loss of alternating current power supply.

(c) Effect on watertight integrity and stability.

Not observed except as noted in paragraph I (a) above.

(d) Effect on personnel and habitability.

Damage to electrical equipment in the pump room resulted in food spoilage due to loss of the ice machine. Loss of air conditioning would have noticeably reduced personnel comfort. However, consideration must be given to the probability that the flooding sustained was slow and could have been prevented with a crew on board.

In addition to the above, the possible effects of radioactivity should be considered.

(e) Total effect on fighting efficiency.

The loss of the alternating current power system would have seriously affected fighting efficiency. Flooding and loss of electrical equipment would probably have eventually resulted in inability to submerge. However, had a crew been on board, all electrical damage could have been prevented.

IV. General Summary of Observers' Impressions and Conclusions.

There was no significant effect directly attributable to the atom bomb on electrical equipment. It is considered that, for a submerged submarine, this ship was outside the range of significant electrical damage by a sub-surface atom bomb. Had a ship's crew been on board, the damage suffered indirectly by electrical equipment could have been prevented.

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V. Preliminary Recommendations.

Installation of feeder and junction boxes for auxiliary power and lighting systems should be held to a minimum in the pump room.

Controllers and associated control equipment for rotating electrical equipment should be located in the same watertight compartment as the rotating equipment, wherever possible.

Consideration should be given to locating duplicate electric-driven vital machinery and associated electric control equipment in separate compartments so as to minimize the extent of damage from such causes as flooding.

DETAILED DESCRIPTION OF ELECTRICAL DAMAGE

A. General Description of Electrical Damage.

(a) Overall condition.

Electrical equipment suffered no damage except that caused indirectly due to flooding of the pump room and leakage of fuel oil into the after battery compartment.

(b) Areas of major damage.

Electrical damage was confined to the pump room, control room and after battery compartment.

(c) Primary causes of damage in each area of major damage.

All electrical damage was caused by salt water entering the pump room and control room, and by fuel oil leaking into the after battery compartment.

(d) Effect of Target test on overall operation of electric plant.

1. Electric Propulsion.

No effect. Operable.

2. Main storage batteries.

Although fuel oil entered three cells and accumulated in the well of the after battery compartment, it is considered that the after battery could still be operated for an indefinite period, if conditions so required. The forward battery was still operable.

3. Auxiliary power.

After distribution system was not damaged. The forward distribution system was seriously impaired due to grounds from salt water.

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4. Communications.

Telephones were operable. All other communication systems were inoperable.

5. Fire control circuits.

Inoperable.

6. Lighting.

Practically inoperable forward of after battery compartment due to grounding of cables and lighting equipment.

7. Ventilation.

Operable.

(e) Types of equipment most affected.

Since the damage was caused by flooding, no particular distinction as to types of equipment most affected was noted.

B. Electric Propulsion Rotating Equipment.

No damage.

C. Electric Propulsion Control Equipment.

No damage. Some rust had accumulated on the metal handles of the engine speed control transmitters, apparently due to water dripping from the overhead in front of the propulsion control cubicle.

D. Generators - Ship's Service.

Not applicable.

E. Generators - Emergency.

Not applicable.

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F. Switchboards, Distribution and Transfer Panels.

No damage occurred other than that caused indirectly by salt water in the pump room and control room. Four automatic voltage regulators in the pump room, for the I. C. motor-generator sets, were rendered inoperable because of submergence.

In the control room, the lower sections of the I. C. switchboard and of the master gyro and repeater switchboard were soaked with salt water, rendering these switchboards inoperable. These switchboards are located in the starboard forward quarter of the control room and were damaged when water flowed forward as the bow took a thirty degree down angle while the submarine was being surfaced.

The forward auxiliary generator and distribution switchboard, which is located further aft in the control room, was also found to have a number of moisture grounds.

A non-watertight lighting distribution box located on the starboard side of the control room forward bulkhead was rendered temporarily inoperable due to moisture grounds.

G. Wiring, Wiring Equipment and Wireways.

No damage occurred other than that caused indirectly due to salt water. In the pump room, control room and storeroom this was due to the flooding previously noted. The cables located beneath the floor plates in the conning tower were also submerged when water apparently leaked through number two periscope packing gland.

Temporary loss of ship's lighting forward of the after battery compartment occurred due to grounds in the ship's lighting feeder in the pump room. This damage probably could have been avoided if the lighting feeder had been located at a higher level in the control room.

Recommendations:

Installation of feeders and junction boxes for auxiliary power and lighting systems should be held to a minimum in the pump room.

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H. Transformers.

No damage other than the grounding of two transformers located on the interior communication switchboard, as covered in Item F.

I. Submarine Propelling Batteries.

There was no damage to the submarine propelling batteries other than that due to leakage of fuel oil into the after battery well. The oil leaked out when an inboard fuel oil vent valve beneath the galley sink in the line leading to fuel ballast tank No. 3A jarred partially opened. The fuel oil flowed across to the starboard side and aft in the waterway. The fuel oil which leaked into the after battery well immersed the two lowest rows of cells to a depth of three feet, the next two rows to a depth of two feet and the two outboard rows to a depth of one foot. Appreciable quantities of fuel oil entered cells 62, 63 and 105, which are located adjacent to the forward bulkhead of the after well. The fuel oil apparently entered the cells around the breather caps.

The sealing pitch around the top of cells in the vicinity of the battery hatch was appreciably softened by the fuel oil.

The electrolyte was syphoned from the contaminated cells and replaced. The after battery well was drained free of fuel oil and washed with fresh water. The after battery was then left on open circuit. Ground readings from positive and negative terminals to ground measured about 90 volts as compared to about 25 volts prior to the test.

Commanding Officer's Report No. 5 states that due to the adverse effects of oil on rubber, it is anticipated that some of the cell jars in the after battery will have to be replaced.

Both batteries were fully charged and on open circuit during the test. Analysis of electrolyte samples after the test by Pearl Harbor Naval Shipyard revealed no significant changes attributable to the atom bomb.

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J. Portable Batteries.

Not applicable.

K. Motors, Motor-Generator Sets and Motor Controllers.

There was no damage other than that caused indirectly by flooding of the pump room. The pump room was flooded with salt water when shock probably jarred open the hull flapper valve in the ten pound blow line to No. 6B-6D main ballast tank. The water flooded the pump room to the level of the control room deck. The following electrical equipment was completely flooded with salt water and rendered inoperable.

Trim pump motor and priming pump motor.
Drain pump motor.
Drill press motor.
Ten pound blower motor.
Two hydraulic pump motors.
Two air conditioning compressor motors and circulating water pump motors.
Two high pressure air compressor motors.
Ice machine compressor motor.
Vertical antenna hoist motor.
Two radio motor-generator sets.
Two gyro motor-generator sets.
Two I.C. motor-generator sets.
All controllers for the above motors and motor-generator sets.
Two controllers for the I.C. motor-generator sets located in the engine rooms.

The flooding of the pump room resulted in the complete loss of operation of vital services such as air conditioning, high pressure air, gyro, radio and interior communication services. Since the two controllers and voltage regulators for the two I.C. motor-generator sets in the engine rooms were also in the pump room, these two sets could not be used despite the fact that they were still operable.

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Recommendations:

The controllers and voltage regulators for the I.C. motor-generator sets in the engine rooms should be located in the same respective compartments as these motor-generator sets. Consideration should be given to locating duplicate electric-driven vital machinery and associated electric control equipment in separate compartments so as to minimize the extent of damage from such causes as flooding.

L. Lighting Equipment.

Lighting equipment suffered no damage other than that caused indirectly by flooding. The ship's lighting system was inoperable in the pump room, control room, conning tower and store-room due to grounds in equipment. Emergency lights in the pump room were inoperable due to grounds. Refer also to Items F and G for damage to lighting feeder cables and a lighting distribution box.

M. Searchlights.

The signal searchlight was removed from ship during the test.

N. Degaussing Equipment.

Not applicable.

O. Gyro Compass Equipment.

(a) Master.

The master gyro compass showed no visible evidence of damage. However, water had splashed over internal parts through openings in the lower part of the casing. Grounds in the compass and associated equipment prevented operational checks.

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(b) Auxiliary.

The auxiliary gyro compass showed no visible evidence of damage, but was also splashed or partially submerged. Grounds in the compass and associated equipment prevented operational checks. A slight amount of mercury was spilled.

P. Sound Powered Telephones.

No damage.

Q. Ship's Service Telephones.

Not applicable.

R. Announcing Systems.

No visual damage. Grounds in the I.C. switchboard prevented operational checks.

S. Telegraphs.

No visual damage. Grounds in the I.C. switchboard prevented operational checks.

T. Indicating Systems.

No visual damage. Grounds in the I.C. switchboard prevented operational checks.

U. I.C. and A.C.O. Switchboards.

Refer to Item F for damage to the I.C. switchboard caused by water.

V. F.C. Switchboards.

There was no damage to fire control circuits other than to switches and equipment located on the switchboards in the control room and covered under Item F.

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SECTION IV

PHOTOGRAPHS

TEST BAKER

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AB-CR-MIK-6504-5. View of rubber lining of after battery tank damaged by fuel oil.

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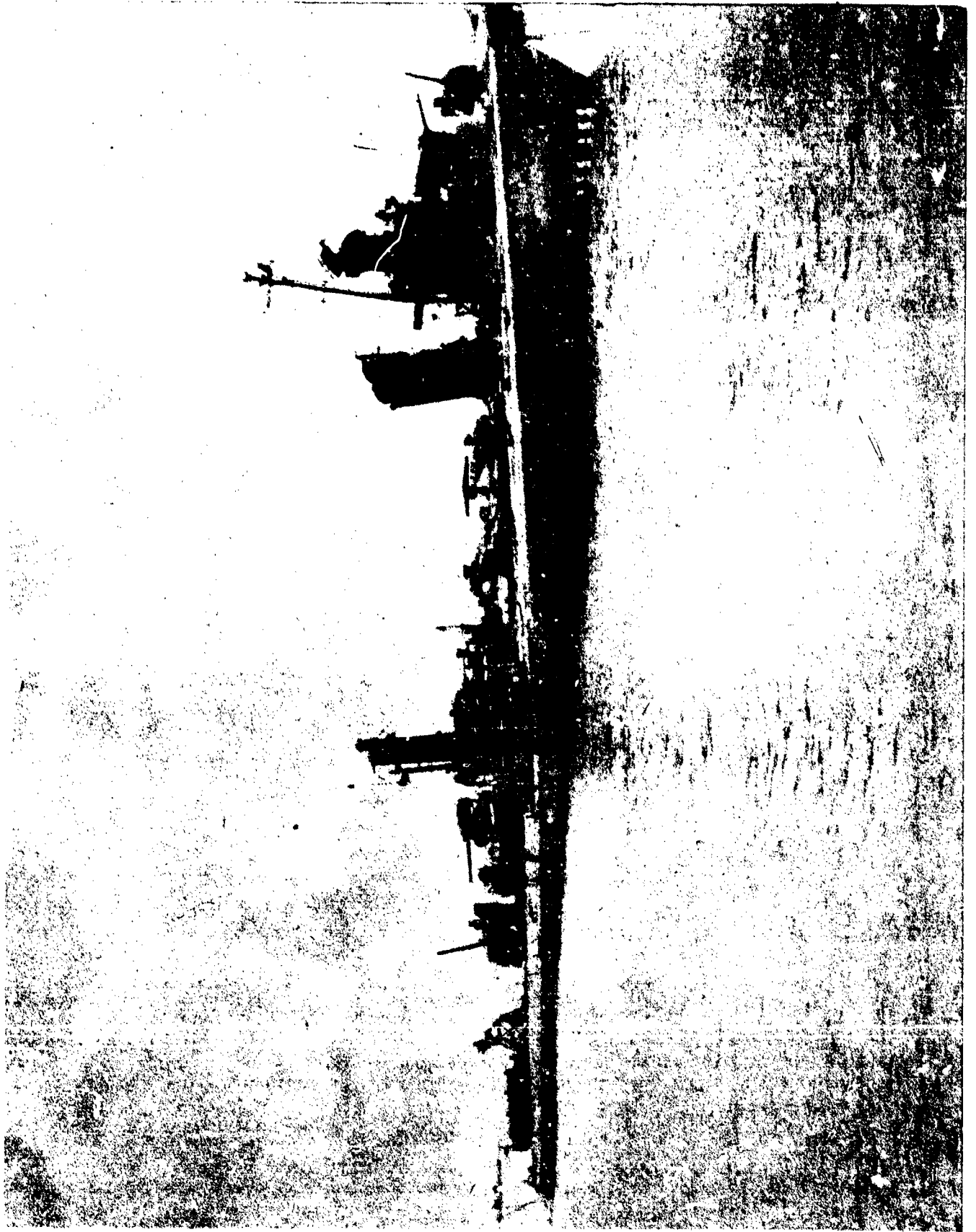
AB-CR-227-290-27. General view from ahead - vessel beached.

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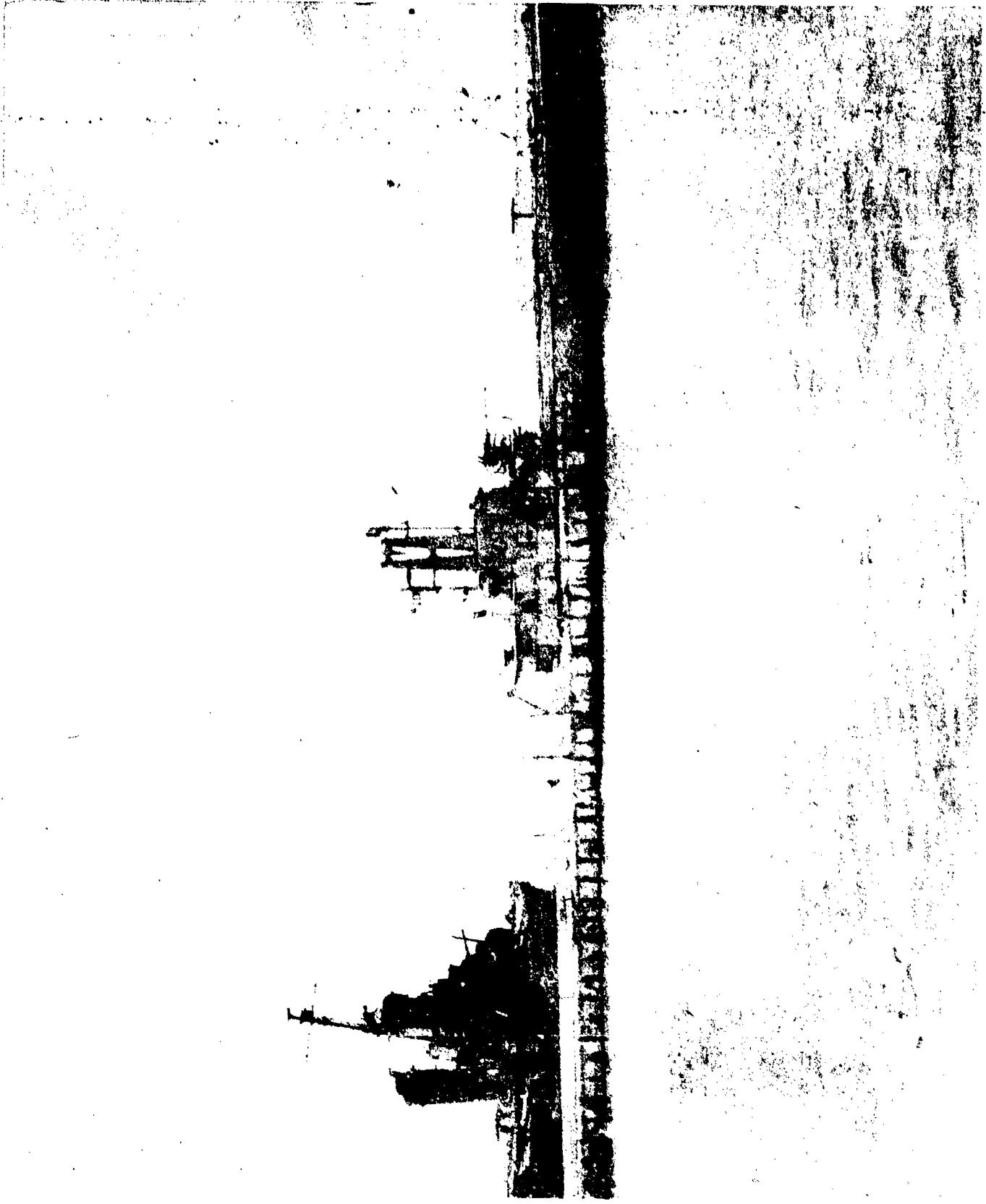
AB-CR-227-290-28. General view from starboard bow - vessel beached.

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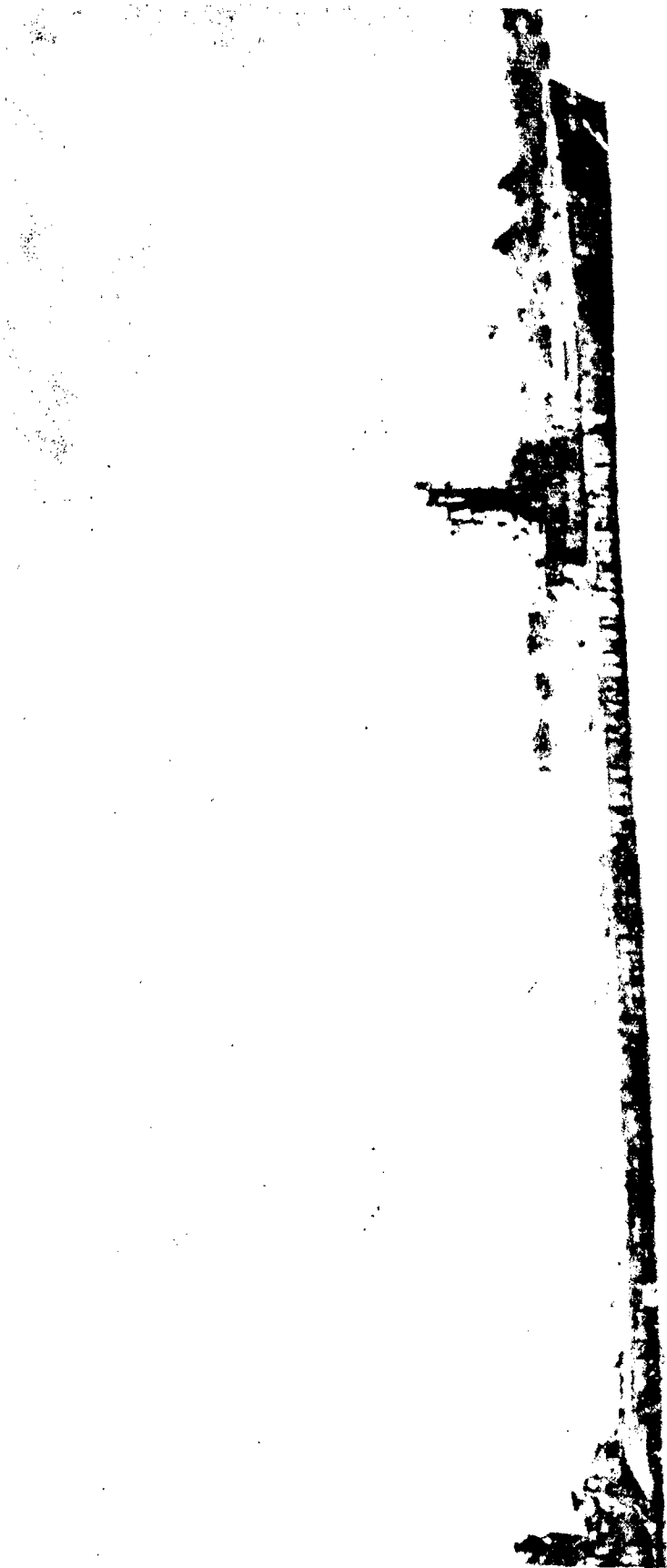
AB-CR-227-290-29. General view from starboard beam - vessel beached.

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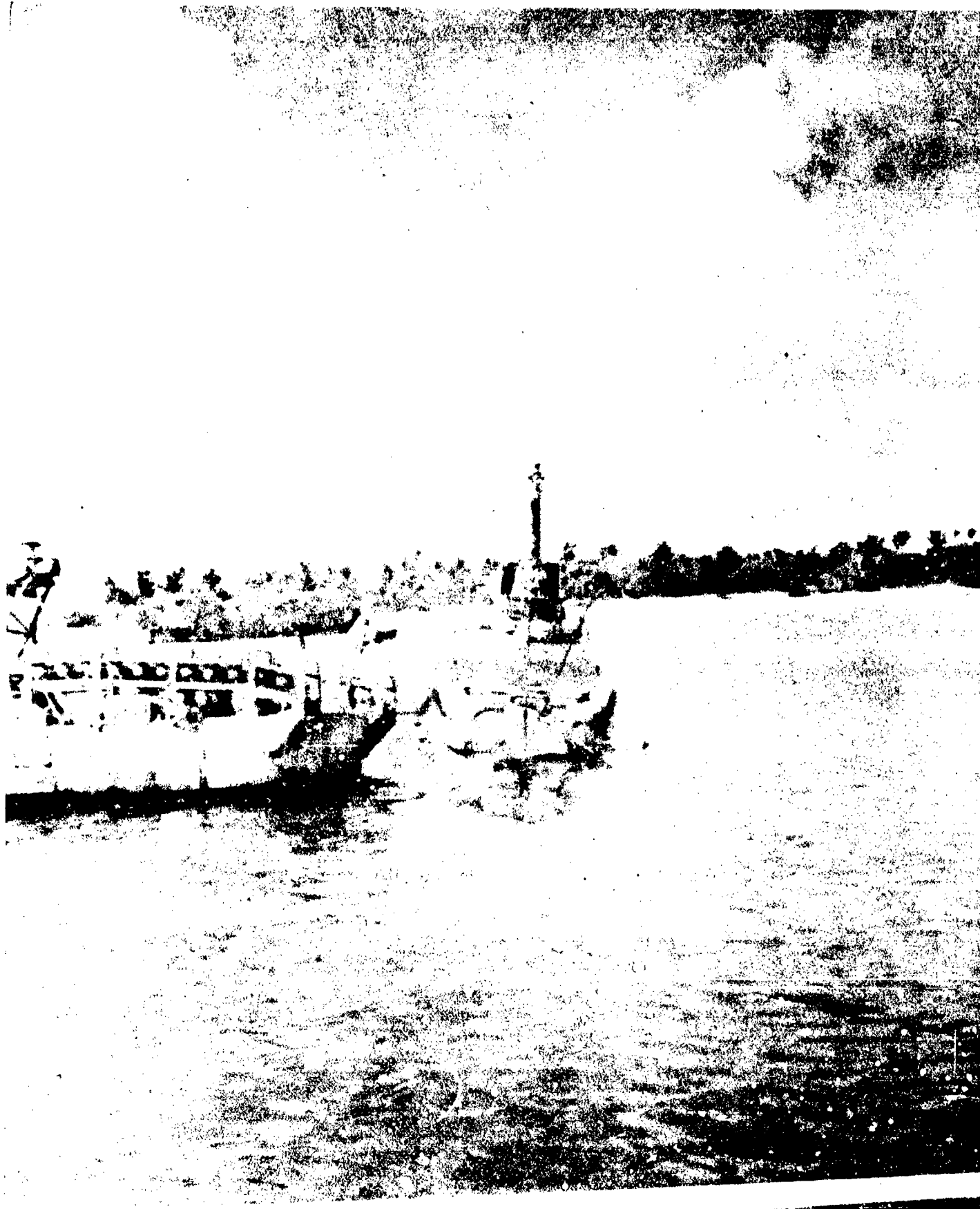
AB-CR-227-290-30. General view from starboard quarter - vessel beached.

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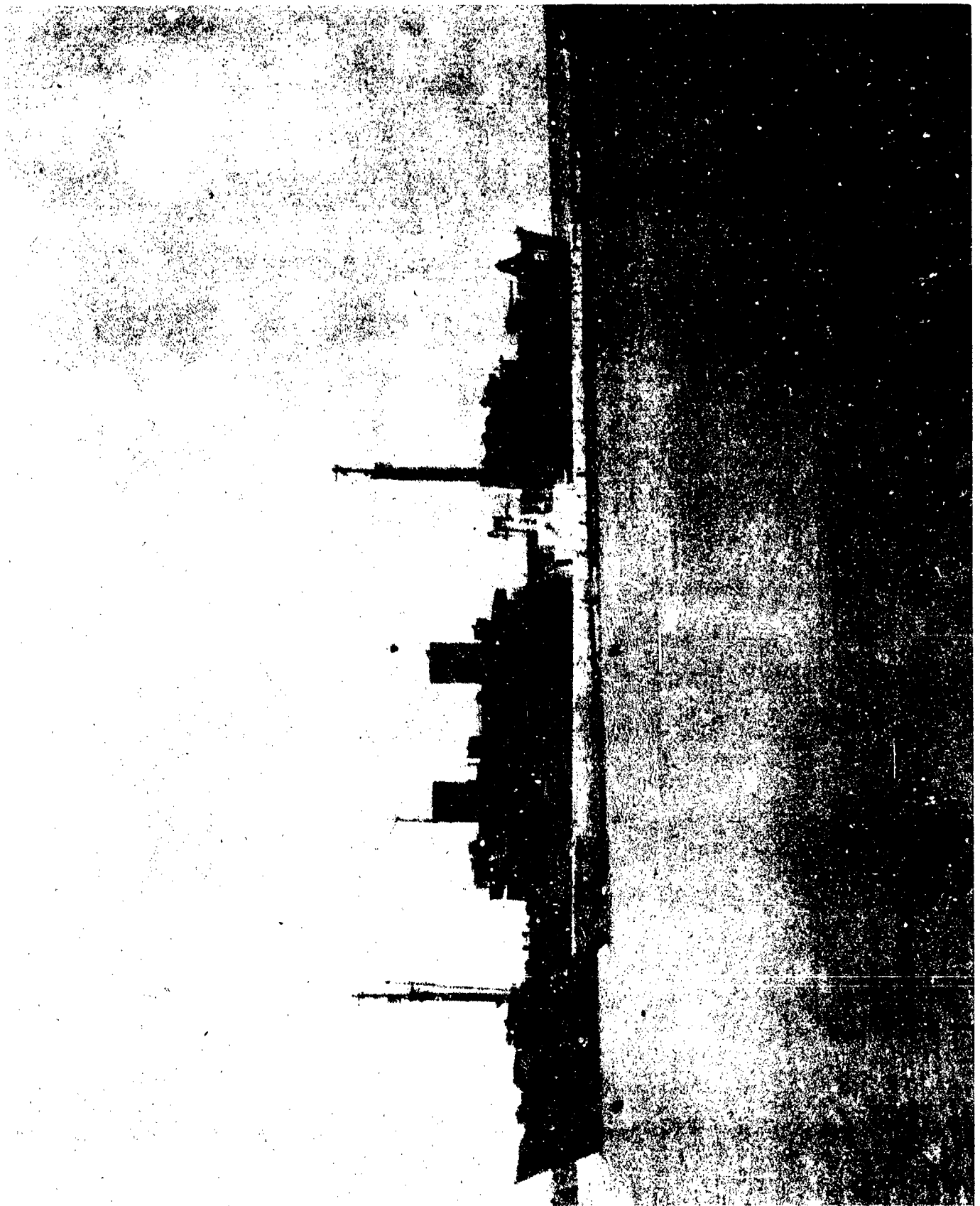
AB-CR-227-290-31. General view from astern - vessel beached.

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AB-CR-227-290-25. General view from port beam - vessel beached.

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AB-CR-227-290-26. General view from port bow - vessel beached.

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AB-CR-MIK-6504-10. View of 10 lb. blow line gate valve for MBT-6-D showing leakage through closed valve.

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AB-CR-MIK-6504-11. View showing location of gate valve in 10 lb. blow line to MBT-6-D; gate valve and check valve removed.

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APPENDIX

COMMANDING OFFICER'S REPORT

TEST BAKER

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COMMANDING OFFICER'S REPORT

REPORT NO. 11

SECTION I:

Name of target vessel : U.S.S. DENTUDA
Type : Submarine
Number : SS-335
Class : Heavy hull, fleet type, built
by the Electric Boat Co.
Location in array : Assigned berth about 1,500
yards from burst

At the time of test Baker, U.S.S. DENTUDA was anchored submerged in 29 fathoms of water with her keel between 90 and 95 feet from the surface. The ship was riding to its regularly fitted starboard anchor with 100 fathoms of chain out. A second anchor was dropped from the port side. This second anchor was fitted with a 105 fathom chain into which two 15 fathom loops had been clipped, so that the effective length was only 75 fathoms as long as the special "weak clips" retained the two loops.

For submergence four weights of about 10,000 lbs., each were hung near the bow and stern - a total of eight weights. One weight was lost from the bow group but the ship was successfully submerged according to plan by flooding 10,000 lbs. of water into Forward Trim Tank.

The ship was rigged for dive and rigged for depth charge with Special Modifications prescribed in the Submarine Supplement to "Instructions for Target Vessels." The material condition of the vessel was excellent and all machinery and equipment was in good operating condition. The ship was loaded in accordance with directives and carried a full allowance of

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torpedoes, fuel and ammunition, the latter including the amount normally carried in topside stowages. The protection given to inflammable and explosive material was the same that would have been afforded had the ship been carrying this type of material on war patrol.

SECTION II:

Upon reboarding after Test B, the entire topside superstructure and fittings were found to be undamaged. Radioactivity was present at all topside points, the highest readings being obtained in the vicinity of the bridge and conning tower superstructure.

Relatively heavy damage to machinery and electrical installations was found below decks. Salt water flooding caused the greater part of the damage, with Diesel Oil flooding causing the remainder. This damage is described in detail later in this report. Compartments affected were:

1. Conning Tower.
2. Control room.
3. Pump room.
4. Store room.
5. Crew's mess.
6. Cold room
7. Chill room.
8. Magazine.
9. Berthing space.
10. After Battery well.

No damage can be said to have been caused as a direct, primary result of the bomb's explosion. At the time the ship was reboarded **and the damage below decks** ascertained, it must be said that the ship could remain in action only by jeopardizing the lives of all personnel and the safety of the ship itself. The fighting efficiency would have been drastically and dangerously reduced.

However, a statement as to the ability of the vessel to remain in action and an estimate of its fighting efficiency in the damaged condition might both be misleading unless it is borne in mind that,

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had personnel been on board, it is almost certain that no damage would have been sustained. Experienced submarine personnel, trained for and in emergencies, would have quickly stopped the leaks that caused all of the damage sustained by this vessel.

It must be admitted, however, that the Commanding Officer does not feel qualified to predict what would have happened to those personnel had they been on board at the time of the burst, although it is almost certain that no casualties would have occurred except for those caused by the radioactive nature of the explosion.

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TECHNICAL INSPECTION REPORT
(SUBMARINES)
PART A. - GENERAL SUMMARY

I. Target Condition After Test.

(a) The drafts at the time of surfacing are not known to the Commanding Officer. However, it is known that the ship had a down angle estimated to be about 10°. No list was noted. The pump room was found to be flooded to the level of the control room deck. It was determined that this flooding took place through the 10 lb., air blow lines to No. 6D and No. 7 Main Ballast Tanks. No. 2 periscope well was flooded due to leaky periscope packing glands. The engine induction was partially flooded; since a 15 lb., pressure test on the induction piping showed only a 3 ounce drop in 15 minutes, it is assumed the partial flooding resulted from slow leakage around the main induction outboard valve. There was no water in the hull ventilation line.

A vent valve in the fuel oil transfer line leading to No. 3 fuel ballast tank was backed off sufficiently to permit fuel oil to leak into the after battery compartment. This fuel oil in turn entered the after battery well, entering at least four cells and contaminating at least half of the battery jars. Considerable damage to the after battery appears evident, but the exact extent cannot be determined until the ship returns to a base where facilities permit proper investigation of the damage. The after battery has been placed on open circuit.

(b) No structural damage was sustained as a direct result of the bomb. In beaching it is believed that a small leak was sprung in either No. 1 or No. 2 Normal Fuel Oil Tanks at about frame 40.

(c) Operability was reduced greatly. However, had personnel been aboard it is felt that no loss of operability would have resulted in that the flooding could easily have been stopped. The machinery and electrical installations in the pump room were all completely flooded out. A yard overhaul will be necessary to restore normal safe operating conditions. Ship control,

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fire control, gunnery and electronics all were impaired due to loss of I.C. power (60 cycle A.C.). The fuel oil in the after battery well also placed the after battery out of commission.

(d) No evidence was found of extreme heat or fires. Personnel casualties in the submerged condition would have been due entirely to radiation effects.

II. Forces Evidenced and Effects Noted.

(a) No evidence of extreme heat was noted.

(b) No fires or explosions took place.

(c) The shock of the bomb opened two flapper valves on the 10 lb. air blow manifold in the control room. As a direct result of this, the pump room was flooded. The shock also backed off a small vent valve in a fuel oil line in the After Battery compartment. As a result of this, the battery well, the magazine, the cool room, and the cold room were all partially flooded with Diesel Oil.

(d) No effects were observed that were peculiar to the Atom Bomb.

III. Results of Test on Target.

(a) No direct adverse effects were made on propulsion and ship control, but the loss of I.C. power was a serious impairment.

(b) The loss of I.C. power again proved a serious blow to gunnery and fire control.

(c) Watertight integrity was maintained with the exception of the hull flapper valves in the 10 lb., blow lines. Stability was affected only the resulting flooding, all of which was well below the center of gravity.

(d) No effect on habitability was noted. How much personnel would have suffered as a result of radiation is not known.

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However, the atom bomb as a bomb in a simple explosive sense would undoubtedly not have affected personnel any more adversely than a severe depth-charging.

(e) Fighting efficiency was cut almost to zero, but only as a result of flooding which could have been prevented by personnel had they been aboard.

SECTION IV.

One's first impression upon seeing the ship after it was surfaced would be that it had sustained no major damage. The failure of two or three valves to hold their seats caused damage that could be classified in no other way than major. The absence of personnel on board showed the need that even the best machines and the finest equipment have for the guidance of the human hand motivated by trained intelligence.

SECTION V.

Recommendations.

1. That lighting feeders leading forward through the pump room be moved into a high place in the control room to keep them from being flooded out should the pump room flood.

2. That a more positive locking device be designed and employed on the 10 lb. blow flapper valves.

3. That the panels for two I.C. motor generators be placed in the engine room with the I.C. motor generators they control. Present design of this class submarine has all four I.C. motor generator panels in the pump room.

4. The I.C. switchboard (distribution) is located in the forward starboard corner of the control room. This switchboard was flooded out when water from the pump room covered

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the switchboard in surfacing with a large down angle. Had the switchboard been located in the after part of the control room it would not have been flooded. Since flooding a pump room is generally followed by the ship taking a large down angle, it is recommended that vital electrical switchboards such as the I.C. switchboard be so located as to minimize chances of damage.

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PART "C" - INSPECTION REPORT
SECTION I - HULL
(SUBMARINES)

A. General Description of Hull Damage.

(a) Overall condition of vessel - the overall condition of the vessel was good structurally but poor operationally.

(b) General areas of hull damage - There was no hull damage except that incident to grounding.

(c) Principal areas of flooding with sources - the pump room flooded through the 10 lb., blow lines No. 6D and No. 7 Main Ballast Tanks. The store room flooded from the pump room. No. 2 periscope well was flooded due to leaky periscope packing glands.

(d) Residual strength, buoyancy and effect of general condition of hull on operability - the condition of the hull had no effect on operability.

B. Superstructure and Weather Decks.

(a) Description and causes of damage (give important dimensions).

1. No damage to:
Forward of conning tower.
Decks and framing.
Vertical plating and framing (incl. bulkheads).
Fittings.
Foundations.
2. No damage to:
Conning tower fairwater.
Decks and framing.
Vertical plating and framing (incl. bulkheads).
Fittings.
Foundations.

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3. No damage to:
Aft of conning tower.
Decks and framing.
Vertical plating and framing (incl. bulkheads).
Fittings.
Foundations.
4. No damage to:
Miscellaneous stowage in superstructure.

(b) Evidence of fire not covered in (a) above - no evidence of fire.

(c) Estimate of relative effectiveness against heat and pressure wave of:

1. Various plating thicknesses.
2. Various shaped surfaces.
3. Surfaces at various angles to line of attack.
4. Surfaces having difference in types of covering.
5. S.T.S. compared to MS.

No estimate can be made as no damage was experienced.

C. Turrets, Guns and Directors:

(a) Guns.

1. General condition of gun and foundations (could an intact gun be fired). No damage encountered, all equipment in good operating condition.

(b) Target bearing Transmitter foundations.

1. General condition (could an intact TBT be trained). No damage encountered, all equipment in good operating condition.

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(c) Periscope and radar masts.

1. General condition of shears.
2. General condition of foundations.

No damage encountered, all equipment in good operating condition.

(d) Constructive criticism of design or construction.

No damage encountered, all equipment in good operating condition.

D. Torpedo Tubes and Appurtenances.

(a) Tubes.

1. General condition especially as to watertight integrity.
2. What percent are out of action.

No damage encountered.

(b) Cradles and loading gear.

1. General condition of operability.

No damage encountered.

(c) Air flasks and war heads.

1. General condition.
2. Adequacy of protection

No damage encountered.

(d) Constructive criticism of location, design and construction.

No damage encountered.

E. Weather Deck.

Combined with Item B.

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F. Exterior Hull above Waterline.

(a) Condition and causes of damage to.

1. Pressure hull plating and framing.
2. Bow framing.
3. Stern framing.
4. Welding.
5. Structural castings.

No damage encountered.

(b) Constructive criticism of design or construction.

No damage encountered.

G. Compartments.

(a) Damage to shell, bulkheads and framing and causes - no damage encountered.

(b) Damage to joiner bulkheads, decks, and floor-plates and causes - no damage encountered.

(c) Damage to access closure and cause - no damage encountered.

(d) Damage to hull fittings and equipment and causes - no damage encountered.

(e) Damage to foundations, shock mounts, and sound mounts, and causes (include battery tanks) - no damage encountered.

(f) Evidences of fire - no damage encountered.

(g) Damage to watertight integrity and causes - the watertight integrity of the control room was reduced when two hull flapper valves on the 10 lb., air manifold were jarred open by the blast. As a result the pump room flooded.

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Damage to watertight integrity and causes - the watertight integrity of the After Battery Compartment was reduced when a vent valve in the fuel filling and transfer line to No. 3A Fuel Ballast Tank was backed off its seat by the blast. As a result the crew's mess, crew's berthing space, magazine, cold room, chill room, and after battery well were all partially flooded with Diesel Oil.

(h) Estimate of reduction in watertight subdivision, habitability and utility of compartments and casualties to personnel - had personnel been aboard to stop flooding, no reduction in habitability and utility in any compartment would have taken place, nor would any personnel casualties have been experienced outside of radiation casualties.

(i) Constructive criticism as to design or construction - design and install more positive locking device for 10 lb., air flapper valves.

H. Armor Decks.

(a) None fitted.

I. Combined with Item G.

J. Underwater Hull.

(a) Condition and causes of damage to.

1. Pressure hull plating and framing.
2. Bow framing.
3. Stern framing.
4. Structural castings.
5. Struts and stern tubes.
6. Rudders and planes.
7. Keels.
8. Miscellaneous fittings.

No damage that can be observed.

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(b) Effect of damage on.

1. Buoyancy.
2. Operability surfaced and submerged.
3. Maneuverability and resistance.

No damage that can be observed.

(c) Constructive criticism as to design or construction -
No damage that can be observed.

K. Tanks.

(a) Condition and causes of damage to.

1. Exterior tanks.
2. Interior tanks.

No damage observed.

(b) Leakage and causes for all tanks - Fuel Oil leak from one of the fuel oil tanks, normal or fuel ballast. The actual cause cannot be determined until the ship is dry-docked.

(c) Constructive criticism as to design, construction or location - no damage observed.

L. Flooding.

(a) Description of major flooding areas - the pump room and store room flooded to the level of the control room deck. No. 2 periscope well was flooded.

(b) Sources of flooding - the pump room flooded through the 10 lb., blow line to No. 6D and No. 7 Main Ballast Tanks. The store room flooded from the pump room. No. 2 periscope well flooded through leaky periscope packing glands.

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(c) List of compartments or tanks believed to have flooded slowly so as to be susceptible to damage control.

1. Pump room.
2. Store room.
3. No. 2 periscope well.

(d) Constructive criticism as to design or construction -

None.

M. Ventilation.

(a) Condition and causes of damage to.

1. Hull and battery ventilation system outboard.
2. Engine induction system.
3. Ventilation system inboard.

No damage observed, no evidence of heat, smoke or water conducted into any compartment. Engine induction partially flooded; believed due to leaky gasket.

(b) Evidences that ventilation system conducted heat, blast, fire, smoke or water into any compartment - No damage observed, no evidence of heat, smoke or water conducted into any compartment.

(c) Constructive criticism of design or construction - No damage observed, no evidence of heat, smoke or water conducted into any compartment.

N. Ship Control and Fire Control Stations.

(a) Damage to control stations due to failure of compartment boundaries.

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1. Bridge.
2. Conning tower.
3. Control room.

No damage observed.

(b) Constructive criticism of layout, arrangement, and protection.

No damage observed.

O. Combined with Item N.

P. Ammunition Stowage.

(a) Condition and causes of damage to

1. Ready service stowage.
2. Magazines.
3. Constructive criticism as to location, protection, performance, and design or construction.

The magazine was partially flooded with Diesel Oil. This was occasioned by a leak in a vent valve in the fuel oil system. No improvement in design or construction follows, since personnel, had they been aboard, could easily have stopped the leak.

Q. Ammunition Handling.

(a) Condition, operability and causes of damage to.

1. Passing scuttle.
2. Torpedo loading cradles.
3. Torpedo loading derrick.

No damage noted.

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(b) Constructive criticism of design construction or location.

No damage noted.

R. Strength.

(a) Details of any damage to and causes of damage to.

1. Pressure hull plating including conning tower.
2. Pressure hull framing.
3. Main bulkheads.
4. Welding or other joints.
5. Structure in way of discontinuities.

No damage noted.

(b) Constructive criticism.

No damage noted.

S. Miscellaneous.

No remarks.

T. Coverings.

(a) Condition and cause of damage to.

1. Paint
Exterior topside.
Exterior below waterline.
Interior.
2. Galvanizing, plating, etc..
3. Linoleum.
4. Non skid.

No damage other than that caused to interior paint by salt water and Diesel Oil immersion.

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U. Welding and Riveting.

(a) General summary of welding performance

No damage noted.

(b) General summary of rivet performance

No damage noted.

(c) Constructive criticism

No damage noted.

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PART "C" - INSPECTION REPORT

SECTION II - MACHINERY
(SUBMARINES)

A. General Description of Machinery Damage.

(a) Overall condition - there was no damage to any of the main propulsion machinery. Some auxiliary machinery was damaged by immersion in salt water as a result of the flooding of the pump room. The full extent of this damage will not be known until all machinery in the pump room can be dis-assembled, but it is considered that the overall damage will not be heavy. Many units of machinery are now inoperable only because of grounded motors, panels, and electrical leads.

(b) Areas of major damage - all known damage to machinery was confined to the pump room which flooded to the level of the control room deck.

(c) Primary causes of damage in each area of major damage - the primary and only known cause of damage to machinery was salt water flooding.

(d) Effect of target test on overall operation of machinery plant - as a result of flooding all auxiliary machinery in the pump room was inoperable. As previously pointed out, this condition was due to grounded driver motors, panels, and power leads.

B. Boilers.

Not Applicable.

C. Blowers.

Not Applicable.

D. Fuel Oil Equipment.

(a) Heaters - no damage.

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- (b) Strainers - no damage.
- (c) Manifolds - no damage.
- (d) Fittings (thermometers, gages) - a 3/8" vent valve in the fuel filling and transfer line to No. 3A Fuel Ballast Tank was not actually damaged but was backed off about 1-1/2 turns. This allowed fuel oil partially to flood the After Battery Compartment.
- (e) Flexible fueling hose - no damage.

E. Boiler Feedwater Equipment.

Not Applicable.

F. Main Propulsion Machinery.

(a) Main and auxiliary engines.

1. Foundations - no damage.
2. Casings and cylinders - no damage.
3. Bearings, crankshafts, pistons, etc. - no damage.
4. Couplings - no damage.
5. Fuel injection system - no damage.
6. Superchargers - no damage.
7. Governors - no damage.
8. Inboard and outboard exhaust valves - no damage.
9. Mufflers and exhaust piping - no damage.
10. Cooling system - no damage.

G. Reduction gears.

- (a) Foundations and casings - no damage.
- (b) Gears and shafting - no damage.
- (c) Bearings - no damage.
- (d) Couplings (flexible and solid) - no damage.
- (e) Fittings (oil sights, thermometers, etc) - no damage.
- (f) Turning gears - no damage.

H. Shafting and Bearings.

- (a) Shafting - no damage.

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- (b) Bearings and bearing foundations - no damage.
- (c) Alignment - no apparent damage.
- (d) Hull packing gland - no damage.
- (e) Thrust bearings - no damage.
- (f) Strut bearings - not observed.

I. Lubrication Systems.

- (a) Coolers - no damage.
- (b) Filters and strainers - no damage.
- (c) Filters - no damage.
- (d) Tanks (sump, settling etc.) - no damage.
- (e) Fittings (gauges, etc.) - no damage.

J. Condensers and Air Ejectors.

Not Applicable.

K. Pumps.

- (a) Booster drain pump - no damage.
- (b) Circulating pumps - no apparent damage; those in pump room inoperable due to grounded motors.
- (c) Trim pump - no apparent damage; inoperable due to grounded motor and panel.
- (d) Drain pump - no apparent damage; inoperable due to grounded motor and panel.
- (e) Priming pumps - no apparent damage; inoperable due to grounded motor and panel.
- (f) Fuel oil pumps - no damage.
- (g) Lubricating oil pumps - no damage.
- (h) Distiller feed pump - no apparent damage; inoperable due to grounded motor.

L. Auxiliary Generators.

Discussed under Item F (Main Propulsion).

M. Propellers.

- (a) Blades - no damage.

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(b) Caps, nuts, etc. - no damage.

N. Distilling Plant.

- (a) Distillers - no damage.
- (b) Compressors - no damage.
- (c) Miscellaneous valves fittings, gages, attached piping, etc. - no damage.

O. Refrigerating and Air Conditioning Plants.

- (a) Compressors - no apparent damage.
- (b) Motors - grounded out due to salt water flooding.
- (c) Condensers - no apparent damage.
- (d) Foundations - no damage.
- (e) Refrigerant piping and cooling coils - no damage.
- (f) Insulation and lagging - no damage.
- (g) Miscellaneous valves, switches, controls, fittings, etc. - all panels and switches in pump room flooded with salt water and completely grounded out.

P. Winches, Windlasses, and Capstans.

- (a) Foundations and bed plates - no damage.
- (b) Brakes and brake lining - no damage.
- (c) Gearing - no apparent damage.
- (d) Drums, bearings, shafting - no apparent damage.
- (e) Hydraulic systems - no damage.
- (f) Fittings, valves, etc. - no damage.

NOTE: The anchor windlass and forward capstan were in operable due to lack of hydraulic power. The hydraulic plant was out of commission due to flooded and grounded hydraulic pump motors and panels.

Q. Steering and Diving.

- (a) Steering rams and cylinders - no damage.
- (b) Hydraulic systems including pumps piping, etc. - no damage.

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- (c) Bow plane rigging mechanism - no apparent damage; inoperable due to grounded hydraulic plant motors and panels.
- (d) Stern plane tilting mechanism - no apparent damage; inoperable due to grounded hydraulic plant motors and panels.
- (e) Bow plane tilting mechanism - no apparent damage; inoperable due to grounded hydraulic plant motors and panels.
- (f) Foundations - no apparent damage.
- (g) Miscellaneous (steering stands, valves, gages, etc.) - no apparent damage.

R. Elevators, Ammunition Hoists, Etc.

Not Applicable.

S. Ventilation (Machinery).

- (a) Battery ventilation blowers - no damage.
- (b) Battery air flow meters - no damage.
- (c) Hull supply and exhaust blowers - no damage.
- (d) Engine air and ventilation induction hull valves and mechanisms - no damage.
- (e) Bulkhead flappers - no damage.
- (f) Foundations and mountings - no damage.
- (g) Fans and motors - no damage.

T. Compressed Air Plant.

- (a) High pressure air compressors - no apparent damage; inoperable due to grounded motors and panel.
- (b) Low pressure blowers - no apparent damage; inoperable due to grounded motor and panel.
- (c) Foundations - no damage.
- (d) Coolers - no apparent damage.
- (e) Air banks - no damage.
- (f) Torpedo impulse flasks - no damage.
- (g) Miscellaneous gages, attached piping, etc. - no damage.

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U. Diesels.

Not Applicable (See Item F.).

V. Piping Systems.

- (a) High pressure (3000 lb.) air piping - no damage.
- (b) Main ballast tank blow (600 lb.) air piping - no damage.
- (c) Service (100 lb.) air piping - no damage.
- (d) Main ballast tank blow (10 lb.) air piping - no damage.
- (e) Torpedo impulse air piping - no damage.
- (f) Engine air starting piping - no damage.
- (g) Engine shut-down air piping - no damage.
- (h) Salvage air piping - no damage.
- (i) Main ballast tank vent piping - no damage.
- (j) Hull and battery ventilation piping - no damage.
- (k) Trimming system piping - no damage.
- (l) Drain system piping - no damage.
- (m) Magazine flooding piping - no damage.
- (n) Plumbing piping - no damage.
- (o) Fuel oil piping - no damage.
- (p) Fuel oil compensating piping - no damage.
- (q) Lubricating oil piping - no damage.
- (r) Hydraulic system piping - no damage.
- (s) Engine cooling salt water piping - no damage.
- (t) Engine cooling fresh water piping - no damage.
- (u) Main motor cooling salt water piping - no damage.
- (v) Distiller feed piping - no damage.
- (w) Refrigeration circulating water piping - no damage.
- (x) Air conditioning circulating water piping - no damage.
- (y) Freon piping and coils - no damage.
- (z) Air compressor circulating water piping - no damage.
- (aa) Portable fresh water piping - no damage.
- (bb) Battery water piping - no damage.

W. Hydraulic System.

- (a) Main hydraulic pumps - no apparent damage; inoperable due to grounded motors and panels.

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- (b) Hydraulic accumulator - no damage.
- (c) Main vent hydraulic operating mechanisms - no apparent damage.
- (d) Ballast tank flood valve hydraulic operating mechanisms - no apparent damage.
- (e) Engine air induction valve operating mechanism - no apparent damage.
- (f) Ventilation induction valve operating mechanism - no apparent damage.
- (g) Main engine exhaust valve operating mechanisms - no apparent damage.
- (h) Auxiliary engine exhaust valve operating mechanism - no apparent damage.
- (i) Sound head lower/raise mechanism - no apparent damage.
- (j) Hydraulic hand pump for sound heads - no damage.
- (k) Hydraulic periscope lower/raise mechanism - no damage.
- (l) Hydraulic SD/SV radar mast lower/raise mechanism - no apparent damage.
- (m) Bow plane hydraulic tilting mechanism - no apparent damage.
- (n) Stern plane hydraulic tilting mechanism - no apparent damage.
- (o) Bow plane hydraulic rigging mechanism - no apparent damage.

X. Navigational Instruments.

- (a) Underwater log - no damage.
- (b) Magnetic compasses - no apparent damage.

Y. Periscopes.

- (a) Optics, bearings, train, stadimeter, etc. - no apparent damage.
- (b) Mechanical hoist mechanism - no damage.

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Z. Radar and Sonar.

- (a) Mechanical hoisting mechanism - Hydraulic power has not been available to test out the hoist mechanism.
- (b) Training mechanism - when ship was beached, starboard sound shaft was damaged. Unit will not train.

AA: Miscellaneous.

Machinery not included in above groups should be covered here - no comment.

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PART "C" - INSPECTION REPORT

SECTION III - ELECTRICAL
(SUBMARINES)

A. General Description of Electrical Damage.

(a) Overall condition - the overall condition of the main propulsion electrical equipment was excellent. The overall condition of the auxiliary electrical equipment and Interior Communication equipment was very poor. The after battery of 126 cells was damaged, but the exact extent and seriousness has not yet been determined.

(b) Areas of Major Damage - the greater part of the electrical damage was confined to the pump room. Less damage was sustained in the control room. The after battery was also damaged.

(c) Primary causes of damage in each area of major damage;

1. Pump room - Salt water flooding.
2. Control room - Salt water flooding.
3. After Battery well - Diesel Oil flooding.

(d) Operability of electric plant.

1. Electrical propulsion - unimpaired.
2. Main storage batteries - forward battery undamaged; after battery damaged by fuel oil to such an extent that it was decided to place the battery on open circuit.
3. Auxiliary power - after distribution system undamaged; forward distribution system useless, due to salt water flooding and consequent grounds.

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4. Communications - (This item is assumed to refer to those electrical systems usually grouped under the title of Interior Communications). All I.C. power was lost due to flooding of I.C. motor generator panels. In addition, many of the circuits on the I.C. distribution panel were grounded out.
5. Fire Control Circuits - grounded.
6. Lighting - all normal lighting forward of the after battery compartment was out of commission.
7. Ventilation - undamaged.

(e) Types of equipment most affected - Rotating electrical units and the control panels for them were the most affected. Next were switchboards. Least affected were cables some of which were flooded and grounded out.

B. Electric Propulsion Rotating Equipment (Propulsion motors, propulsion generators, submarine auxiliary generators, exciters, motor-generator sets).

- (a) Frame and mountings - no damage.
- (b) Commutator or slip rings - no damage.
- (c) Brushes and brush rigging - no damage.
- (d) Bearings - no damage.
- (e) Fans or blowers - no damage.
- (f) Internal lighting fixtures - no damage.
- (g) Air coolers and filters - no damage.

C. Electric Propulsion Control Equipment (Propulsion control cubicles, transfer switch panels, controllers for motor-generator sets).

- (a) Framework and mountings - no damage.
- (b) Electrical connections and wiring - no damage.
- (c) Busbars - no damage.
- (d) Contactors, switches and relays

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- (e) Rheostats and resistors - no damage.
- (f) Mechanical operating mechanisms and interlocks - no damage.
- (g) Insulating materials - no damage.
- (h) Instruments - no damage.
- (i) Fuses - no damage.
- (j) Rectifiers - no damage.
- (k) Regulators - no damage.

D. Generators - Ships Service.

See Item K.

E. Generators - Emergency.

Not Applicable.

F. Switchboards, Distribution and Transfer Panels (Ships Service, Emergency, Battery Charging, Lighting and Test Switchboards - Power and Lighting Distribution Panels - Submarine Torpedo Heating and Hydrogen Burning Panels - Transfer Panels - Degaussing Panels).

- (a) Framework and Mountings - no damage.
- (b) Electrical connections and wiring - grounded.
- (c) Busbars - no damage.
- (d) Circuit breakers, contactors, switches and relays - grounded.
- (e) Rheostats and resistors - grounded.
- (f) Mechanical operating mechanisms and interlocks - no damage.
- (g) Insulating materials - no damage.
- (h) Instruments - no damage.
- (i) Rectifiers - no damage.
- (j) Fuses - no damage.
- (k) Voltage regulators - no damage.

NOTE: The above comments apply only to the following specific switchboards, distribution and transfer panels. No other boards and panels

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sustained any damage of any kind:

1. Forward auxiliary distribution panel.
2. Gyrocompass panel.
3. I.C. Distribution panel.
4. Control room lighting distribution panel.
5. F.C. panel.

G. Wiring, Wiring Equipment, and Wireways.

(a) Cable.

1. Power - pump room cables grounded.
2. Lighting - pump room cables grounded.
3. I.C. - cables grounded.
4. F.C. - Cables undamaged.
5. Propulsion - cables undamaged.
6. Degaussing - not applicable.

(b) Wireway supports - undamaged.

- (c)
1. Connections - all open connections in pump room grounded.
 2. Junction boxes - all non-watertight boxes in pump room grounded.
 3. Receptacles - All open receptacles in pump room grounded.
 4. Plugs - all plugs in pump room grounded.

H. Transformers (lighting and I.C.)

(a) Framework and mountings - no damage.

(b) Electrical connections - no damage.

NOTE: Two I.C. transformers in control room I.C. switchboard were grounded.

I. Submarine Propelling Batteries.

(a) Jars - all of the 126 cells jars in the after battery were immersed in Diesel Oil to various depths ranging from 38''

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for the lower two rows to 12'' for the upper two rows. No accurate statement can be made as to the damage caused by this immersion until representative jars are pulled for inspection. No jars were cracked.

(b) Covers - the covers of approximately 20 cell jars were subjected to the action of Diesel Oil. The covers themselves have shown no adverse after effects. However, the sealing compound around these covers has deteriorated badly, becoming soft and gummy.

(c) Wedges and Strongbacks - no apparent damage.

(d) Busbars and cell connections - undamaged.

(e) Acid spillage - none.

NOTE: Diesel Oil actually flooded cells No. 62, 63, and 105 to a depth of about 10 inches.

J. Portable Batteries.

(a) Mounting - no damage.

(b) Jars - no damage.

(c) Cell and cable connections - no damage.

(d) Acid spillage - none.

K. Motors, Motor Generator Sets, and Motor Controllers.

Motor and controllers for engine room auxiliaries, steering gear, deck auxiliaries, air conditioning and refrigeration, ventilation, distilling equipment, etc. - Motor generator sets for lighting, welding, degaussing, battery charging, interior communications, etc.).

(a) Rotating Equipment: The following rotating electrical units were completely flooded with salt water for a period of 8 days:

1. Two L P air compressor motors.
2. One 10 lb. blower motor.

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3. One ice machine compressor motor.
4. Two air conditioning compressor motors.
5. Two air conditioning circulating water pump motors.
6. One trim pump motor.
7. One trim pump priming pump motor.
8. One drain pump motor.
9. Two IMO hydraulic pump motors.
10. Two I.C. motor generator sets.
11. Two Mk 7 gyro motor generator sets.
12. One vertical antenna hoist motor.
13. One radio transmitter motor generator.
14. One drill press motor.

The following general comments are made on the items listed above:

1. Framework and mounting - corroded by salt water immersion.
2. Commutator or slip rings - corroded by salt water immersion.
3. Brushes and brush rigging - flooded and grounded.
4. Bearings - flooded with salt water.
5. Speed regulators - (fitted only on I.C. motor generator sets) flooded and grounded.

(b) Control Equipment: The panels for items 1 through 13 of paragraph (a) above were all immersed in salt water for a period of about 8 days. In addition, the control panels for the two engine room I.C. motor generator sets are located in the pump room and underwent the same 8 day immersion.

The following general comments are made on the above panels.

1. Framework and mounting - corroded by salt water.
2. Electrical connections and wiring - flooded and grounded.
3. Contactors, switches, and relays - flooded and grounded.
4. Rheostats and resistors - flooded and grounded.

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5. Insulating materials - flooded and grounded.
6. Pilot circuit device - flooded and grounded.
7. Brakes - none fitted any equipment listed.

L. Lighting Equipment.

- (a) Lamps (Rough service, rough service high impact and fluorescent lights). - no damage.
- (b) Reflectors - no damage.
- (c) Fixture mounts - no damage.
- (d) Shock mounts (U-strap type and plate type) - no damage.
- (e) Pendant lamp holders - no damage.
- (f) Lamp globes - no damage.

NOTE: Equipment was not damaged. However, lighting was not operable forward of the After Battery Compartment due to grounding of A.C. and D.C. lighting leads.

M. Searchlights (36", 24", 12", and 8").

- (a) Framework and mountings.
- (b) Front glass.
- (c) Shutter and operating mechanism.
- (d) Locks and brakes.
- (e) Arc Lamp feed rods.
- (f) Incandescent lamps.
- (g) Rheostats.

NOTE: Searchlight removed from ship to transport - not applicable.

N. Degaussing Equipment.

Not Applicable.

O. Gyro Compass Equipment.

(a) Master - the binnacle was flooded to a depth of two inches. However, it is not yet known if the master gyro sustained

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any damage, since the gyro motor-generator was flooded and grounded out. As a result no power is available for testing the master gyro or any associated equipment.

NOTE: Auxiliary gyro - binnacle flooded, power leads grounded, oscillator motor grounded, and mercury spilled. Not operable.

- (b) Repeaters - not tested; no power available.
- (c) DRT and DRA - not tested; no power available.

P. Sound Powered Telephones.

- (a) Headsets - no damage.
- (b) Handsets - no damage.
- (c) Jack and switch boxes - no damage.
- (d) Stowage - no damage.

Q. Ships Service Telephones.

Not Applicable.

- (a) Exchange.
- (b) Line equipment.

R. Announcing Systems.

- (a) Portable (PAM and PAB).
- (b) Amplifier racks.
- (c) Control racks.
- (d) Transmitting station.
- (e) Reproducers.
- (f) Inter-communicating units.

The 1 MC and 7 MC systems were not damaged in any way. However, the power supply switch on the I.C. switchboard was flooded and grounded out.

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S. Telephones.

No damage to instruments but supply leads from I.C. panel were grounded.

T. Indicating Systems.

1. Rudder angle indicators - no damage to instruments but supply leads from I.C. switchboard grounded out.

2. Bow and stern plane indicators - no damage to instruments but supply leads from I.C. switchboard grounded out.

3. Shaft revolution indicator - no damage to instruments but supply leads from I.C. switchboard grounded out.

U. I.C. and A.C.O. Switchboards.

1. I.C. switchboard - entire board, all leads, switches, and transformers flooded and grounded out.

2. A.C.O. switchboard - entire board, all leads and switches flooded and grounded out.

V. F.C. Switchboards.

The fire control switchboard was completely grounded out.

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PART "C" - INSPECTION REPORT

SECTION IV - ELECTRONICS
(SUBMARINES)

A. General Description of Electronics Damage.

(a) Overall condition - good. In grounding after the test the starboard sound head was damaged. Not due to Atom Bomb explosion.

(b) Areas of Major Damage - no damage.

(c) Primary cause of damage in each area - no damage.

(d) Operability of Electronics Equipment - operability was practically zero but in the case of every unit tested so far this was due to loss of outside power supplies through grounding and flooding and not to any failure of electronics equipment. Some units have still not been tested inasmuch as not all power supplies have been cleared.

(e) Types of equipment most affected. - none affected.

B. Fire Control Radar

No damage.

C. Surface Search Radar.

No damage.

D. Air Search Radar.

No apparent damage. Set had not been tested due to lack of power supply.

E. Radar Repeaters.

No damage.

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F. Radar Counter Measures Equipment.

None installed.

G. Radar and Radio Beacons.

None installed.

H. IFF Equipment.

No apparent damage. Not tested due to lack of power supply.

I. Communication Transmitters, (Radio).

No apparent damage - set not tested due to lack of power supply. This transmitter, A TBL-12, is powered from a radio motor-generator set located in the pump room. When the pump room flooded, the M.G. set was flooded and grounded out. This is the only electronic unit having an individual motor generator which was inoperable following reboarding.

J. Communication Receivers (Radio.

No damage.

K. Communication Antennae (Radio).

No damage.

L. Radio Transceivers.

SCR 608 - no damage.

SCR 610 - no damage.

SCR 624 - phones were in control room and were flooded and grounded. Not operable.

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M. Sonar Echo Ranging and Listening Equipment.

Not tested due to lack of power supply. It is known, however, that the starboard sound head was damaged in beaching the ship several days after the test. Dry-docking will be required before the exact extent of the damage is determined.

N. Sonar Echo Sounding Equipment and Altimeters.

No altimeter installed.

No apparent damage to Sonar Echo Sounding Equipment. Not tested due to lack of power supply.

O. Loran Navigation Equipment.

No apparent damage.
Set not tested due to lack of power supply.

P. Power Supplies.

As mentioned in Item I, the radio transmitter motor generator set was flooded and grounded out. No other power supplies are known to be damaged, but it was impossible to get external power to them for operation due to grounds in external feeder circuits.

Q. Television and Teletype Equipment.

None installed.

R. Test Equipment (Including Frequency Meters).

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1. OAO frequency meter - no damage.
 2. 60-ABM ~~frequency meter~~ - no damage.
 3. OBU frequency ~~meter~~ - no damage.
 4. OZI tube tester - no damage.
 5. RCA audio channelyst - no damage.

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6. Oscilloscope - no damage.
7. OAP frequency meter - completely flooded and inoperable. This meter was stored in a compartment that was flooded as a result of the test.

S. Instrumentation.

All meters are built in. Their various conditions will be indicated under the items describing the equipment in which installed.

T. Telephone Equipment.

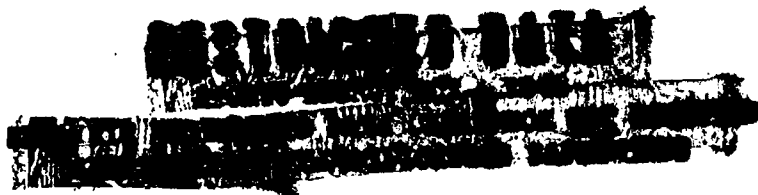
Not Applicable.
Ship's sound powered telephones are covered in another section of this report.

U. Direction Finders (Radio).

None installed.
Loop antennae, which could be used with this type equipment, sustained no damage.

V. Spare Parts.

Approximately 50% of the spare parts (including tubes) were stowed in a compartment that flooded following the test. The remainder sustained no damage.



SECRET

USS DENTUDA (SS335)

CONFIDENTIAL



Defense Special Weapons Agency
6801 Telegraph Road
Alexandria, Virginia 22310-3398

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18 April 1997

MEMORANDUM FOR DEFENSE TECHNICAL INFORMATION CENTER
ATTENTION: OMI/Mr. William Bush (Security)

SUBJECT: Declassification of Reports

The Defense Special Weapons Agency has declassified the following reports:

✓AD-366588 4	XRD-203-Section 12 ✓
AD-366589 L	XRD-200-Section 9
AD-366590 L	XRD-204-Section 13
AD-366591 L	XRD-183
✓AD-366586 X	XRD-201-Section 10 ✓
✓AD-367487 4	XRD-131-Volume 2 ✓
✓AD-367516 4	XRD- 1 143 ✓
✓AD-367493 4	XRD-142 ✓
AD-801410L ✓	XRD-138
AD-376831L ✓	XRD-83
AD-366759 L	XRD-80
✓AD-376830L 4	XRD-79 ✓
✓AD-376828L 4	XRD-76 ✓
✓AD-367464 X	XRD-106 ✓
AD-801404L ✓	XRD-105-Volume 1
✓AD-367459 X	XRD-100 ✓

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✓AD-367491 ✕	XRD-134-Volume 2 ✓
✓AD-367479 ✕	XRD-123 ✓
✓AD-367478 ✕	XRD-122 ✓
✓AD-367481 ✕	XRD-125 ✓
AD-367500 ✓	XRD-159-Volume 2 <i>revised</i>
✓AD-367499 ✕	XRD-160-Volume 3 ✓
✓AD-367498 ✕	XRD-161-Volume 4 ✓
AD-367512 ✓	XRD-147
AD-367511 ✓	XRD-148
✓AD-367465 ✕	XRD-107 ✓
AD-366733 ✓	XRD-43
✓AD-367477 ✕	XRD-121 ✓
✓AD-367476 ✕	XRD-120 ✓
✓AD-367467 ✕	XRD-109-Volume 1 ✓
✓AD-367475 ✕	XRD-119 ✓
✓AD-367474 ✕	XRD-118 ✓
✓AD-367473 ✕	XRD-117 ✓
✓AD-367472 ✕	XRD-116 ✓
AD-367471 ✕	XRD-115 ✓
AD-367466 ✕	XRD-108 ✓
AD-801405L ✓	XRD-113
AD-367470 ✕	XRD-112 ✓
AD-367469 ✕	XRD-111 ✓

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Subject: Declassification of Reports

AD-801406L ✓ XRD-114.

In addition, all of the cited reports are now **approved for public release; distribution statement "A" now applies.**

Arduith Jarrett

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Chief, Technical Resource Center